

11/15/93
102

**ADDENDUM TO PDFI CDAP
FOR SUPPLEMENTAL INVESTIGATIONS**

■■■■■■■■ **NL/TARACORP
SUPERFUND SITE
GRANITE CITY, ILLINOIS**



Prepared for

**U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska**

September, 1993



**Woodward-Clyde Consultants
2318 Millpark Drive
St. Louis, Missouri 63043**



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

October 5, 1993

REPLY TO
ATTENTION OF

Environmental Branch

Mr. Brad Bradley (5HS-11)
U. S. Environmental Protection Agency
Region V
Ralph Metcalf Building
77 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Bradley:

Enclosed for your information are three (3) copies of the Amended Final Chemical Data Acquisition Plan (CDAP) and Site Safety Health Plan (SSHP) for the NL Industries/Taracorp Superfund Site, Granite City, Illinois. All comments relating to the amended plans have been incorporated.

If you have any questions, please contact Mr. Eugene Liu at (402) 221-7169.

Sincerely,

S. L. Carlock

S. L. Carlock, P.E.
Chief, Environmental Branch
Engineering Division

Enclosure

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 PROJECT DESCRIPTION	1-1
1.1 INTRODUCTION	1-1
1.2 SITE INFORMATION	1-2
1.2.1 General Site Features and Geologic Conditions	1-3
1.2.2 Areas of Concern	1-3
1.2.2.1 Adjacent Residential Areas	1-3
1.2.2.2 Remote Fill Locations	1-4
1.2.2.3 Main Industrial Property	1-4
1.2.2.4 Boundary Definition Sampling	1-4
1.3 PREVIOUS INVESTIGATIONS	1-5
1.4 PROJECT PLAN	1-5
1.5 PROJECT SCHEDULE	1-6
2.0 DATA QUALITY OBJECTIVES	2-1
2.1 SITE INVESTIGATION OBJECTIVES	2-1
2.2 DEVELOPMENT OF DATA QUALITY OBJECTIVES	2-2
2.3 QUALITY ASSURANCE OBJECTIVES	2-2
2.3.1 Level of Effort	2-3
2.3.1.1 QC Effort	2-3
2.3.1.2 QA Effort	2-4
2.3.2 Measurement of Data Quality Objectives	2-4
3.0 PROJECT ORGANIZATION AND RESPONSIBILITY	3-1
3.1 RESPONSIBILITIES OF KEY PERSONNEL	3-1
3.1.1 Program Manager/Responsible Professional	3-1
3.1.2 Project Manager	3-1
3.1.3 Project QA/QC Officer	3-2
3.1.4 Project Operations Manager	3-2
3.1.5 Project Health and Safety Officer	3-2

TABLE OF CONTENTS (Continued)

3.1.6	Task Leaders	3-3
3.1.7	Project Staff	3-3
3.1.8	QA/QC Coordinator	3-3
3.1.9	Site Health and Safety Officer	3-4
3.2	SUBCONTRACTORS	3-4
3.2.1	Laboratory Analysis of Soil Samples - Environmetrics, Inc.	3-4
3.2.2	Drilling - Roberts Environmental Drilling, Inc.	3-5
3.2.3	Surveying	3-5
3.3	QUALIFICATIONS OF PERSONNEL	3-5
4.0	FIELD ACTIVITIES	4-1
4.1	ADJACENT RESIDENTIAL AREAS	4-2
4.2	REMOTE FILL LOCATIONS	4-3
4.2.1	Soil Borings and Sampling in Eagle Park Acres	4-4
4.2.2	Soil Borings and Sampling in the Venice Alleys	4-5
4.2.3	Soil Borings and Sampling in the Other Remote Fill Locations	4-6
4.3	BOUNDARY DEFINITION SAMPLING	4-6
4.4	SAMPLE/SURVEY TRACKING SYSTEMS	4-7
4.5	FIELD CORRECTIVE ACTION	4-8
5.0	RE-EVALUATION OF THE FEASIBILITY STUDY AND RECORD OF DECISION	5-1
5.1	REVIEW OF SITE CHARACTERIZATION	5-1
5.2	REVIEW OF BASELINE RISK ASSESSMENT	5-1
5.3	DEVELOPMENT OF RESPONSE PERFORMANCE CRITERIA	5-1
5.4	IDENTIFICATION AND SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES	5-2
5.5	RANKING OF TECHNOLOGIES	5-2

TABLE OF CONTENTS (Continued)

5.6	DEVELOPMENT AND SCREENING OF ALTERNATIVES	5-2
5.7	COMPARATIVE ANALYSIS OF ALTERNATIVES	5-3
6.0	SAMPLE IDENTIFICATION, HANDLING, AND DOCUMENTATION	6-1
6.1	SAMPLE LABELING	6-1
6.2	CHAIN-OF-CUSTODY PROTOCOL	6-1
6.2.1	Field	6-1
6.2.2	Laboratory	6-2
6.3	PACKAGING AND SHIPPING	6-2
7.0	LABORATORY ANALYTICAL PROCEDURES	7-1
7.1	SOIL ANALYSIS FOR LEAD	7-1
7.1.1	Lab Methodology	7-1
7.1.2	Method Specific Data Quality Objectives	7-1
7.1.3	Preventative Maintenance	7-2
7.1.4	Calibration and Frequency	7-2
7.1.5	Corrective Action	7-3
8.0	DATA REDUCTION, VALIDATION, AND REPORTING	8-1
9.0	INTERNAL QUALITY CONTROL CHECKS	9-1
9.1	FIELD QC CHECKS	9-1
9.2	LABORATORY QC CHECKS	9-2
9.2.1	Matrix Duplicate	9-3
9.2.2	Matrix Spike	9-3
9.2.3	Method Blank	9-4
10.0	PERFORMANCE AND SYSTEMS AUDITS	10-1
11.0	CHEMICAL DATA QUALITY MANAGEMENT (CDQM) DELIVERABLES	11-1
11.1	DAILY QUALITY CONTROL REPORTS (DQCR)	11-1

TABLE OF CONTENTS (Continued)

11.2	QUALITY CONTROL SUMMARY REPORTS (QCSR)	11-1
11.3	ANALYTICAL REPORTS	11-2
11.4	ADDENDUM TO THE FEASIBILITY STUDY	11-3
11.5	SITE INVESTIGATION REPORT	11-3

LIST OF TABLES

TABLE 1-1	PROJECT MILESTONES
TABLE 2-1	SAMPLING LOCATION AND ANALYSIS SUMMARY
TABLE 2-2	SAMPLE DISTRIBUTION AND QUALITY CONTROL / QUALITY ASSURANCE SUMMARY
TABLE 2-3	LABORATORY QC LEVEL OF EFFORT FOR ANALYTICAL TESTING
TABLE 4-1	UNSAMPLED RESIDENTIAL LOTS
TABLE 4-2	RESIDENTIAL LOTS TO BE RESAMPLED
TABLE 4-3	BOUNDARY DEFINITION STUDY SAMPLING LIST
TABLE 4-4	SAMPLE BREAKDOWN FOR LOTS TO BE RESAMPLED
TABLE 6-1	SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIMES
TABLE 7-1	ANALYTICAL PROCEDURES AND REPORTING LIMITS

LIST OF FIGURES

FIGURE 1-1	SITE LOCATION MAP
FIGURE 1-2	SITE PLAN SOUTH
FIGURE 1-3	SITE PLAN NORTH
FIGURE 1-4	BOUNDARY DEFINITION SAMPLING AREAS
FIGURE 1-5	PROJECT SCHEDULE
FIGURE 3-1	PROJECT ORGANIZATION CHART
FIGURE 4-1	EAGLE PARK ACRES SAMPLING LOCATIONS
FIGURE 4-2	VENICE ALLEY LOCATION MAP
FIGURE 5-1	FEASIBILITY STUDY REEVALUATION FLOWCHART

LIST OF APPENDIXES

APPENDIX A	QUALITY ASSURANCE/QUALITY CONTROL MANUAL ENVIRONMETRICS LABORATORY, INC.
------------	---

**NL/TARACORP SUPERFUND PROJECT
ADDENDUM TO PDFI CDAP
FOR SUPPLEMENTAL INVESTIGATIONS**

1.0

PROJECT DESCRIPTION

1.1 INTRODUCTION

This project is part of Woodward-Clyde's (W-C) Indefinite Delivery Contract with the U.S. Army Corps of Engineers, Omaha District (USACE), Contract No. DACW45-93-D-0005. Included in this work order are supplemental field activities, and review and revision of the existing Feasibility Study (FS) for the NL/Taracorp Superfund Site (NL Site) located in Granite City, Illinois. The purpose of this investigation is to: 1) further delineate areas where surficial soils will require excavation to achieve the cleanup levels established in the Record of Decision (ROD) for this site (500 ppm for the residential areas and remote fill areas); and, 2) to identify, evaluate, and rank treatment and disposal options on the basis of project specific response performance criteria for waste pile material and contaminated soil.

To accomplish this, the following sequence of tasks will be performed under the present contract:

1. Develop an Addendum to the Pre-Design Field Investigation (PDFI) Chemical Data Acquisition Plan (CDAP) to provide information to estimate the quantities of contaminated soil to be excavated and treated for both on-site and off-site disposal.
2. Complete the field activities and laboratory analytical work required for the Supplemental Investigation, including a limited sampling program to aid in better defining the limits of the site boundary.

3. Revise existing lead concentration maps for each sampling depth interval for the adjacent residential areas. Maps will also be produced which delineate the spacial extent of the hard rubber fill material that will require excavation, treatment and disposal in the additional remote fill areas that have been identified.
4. Identify, evaluate, and rank potential disposal alternatives for the main industrial site waste piles consisting primarily of smelter slag and hard rubber battery casing material, and estimate disposal costs and limitations.
5. Re-evaluate and update the existing FS resulting in the submittal of an Addendum to the FS.
6. Produce a Technical Report to be submitted to USACE summarizing project activities.

Future tasks that are beyond the scope of W-C's present contract include collection and analysis of treatability samples, and remedial design for the NL Site and adjacent affected areas.

This Addendum to the PDFI CDAP defines the activities and standard operating procedures that are necessary to conduct the supplemental site investigation activities at the NL/Taracorp Superfund Site and to provide data of sufficient quality to fulfill the project data quality objectives.

1.2 SITE INFORMATION

The NL Site is located in the cities of Granite City, Madison, and Venice, in Madison County, Illinois, approximately two miles east of St. Louis, Missouri (Figure 1-1).

1.2.1 General Site Features and Geologic Conditions

The site is located within the portion of the Mississippi River Valley known as the American Bottoms. It is outside of the 100 year flood plain. The area is underlain by a sequence of alluvial, glaciofluvial and glaciolacustrine deposits to a depth of approximately 100 feet. These deposits generally become coarser with depth. Bedrock consists of Carboniferous age limestone, sandstone and shale. The Remedial Investigation (RI) (O'Brien & Gere, 1988) described the surficial soils as typically silty clay to fine sandy loams of the Riley-Landes-Parkerville Association that are generally under grass or forest cover. The site area tends to be flat and poorly drained.

1.2.2 Areas of Concern

The field investigation will focus on two principle areas: the adjacent residential areas (Granite City and Madison), and the remote fill locations containing hard rubber battery casing material derived from the Taracorp and SLLR pile (Figures 1-2 and 1-3). The review and revision of the FS will focus on the alternatives available for dealing with the Taracorp and SLLR waste piles. A limited soil sampling program will be conducted on residential properties outside the current site boundaries to determine if additional areas should be included in the NL Site.

1.2.2.1 Adjacent Residential Areas

The adjacent residential areas around the main industrial property include approximately 520 acres within the towns of Granite City, Madison, and Venice, Illinois. Residences consist of small to moderate size homes on modest size lots. The lead contamination in the soil is a direct result of airborne particulate fallout from the lead smelting operations. As part of the PDFI, 844 properties were sampled to determine soil lead levels. Subsequent to the conclusion of the PDFI, access for soil sampling has been granted for 129 additional properties. These properties will be sampled as part of this investigation.

In addition, 41 residences that were sampled as part of the PDFI will be resampled due to anomalous results. Only those borings with results considered to be anomalous are being resampled. USEPA believes data from certain borings at these residences appears anomalous.

1.2.2.2 Remote Fill Locations

A number of additional areas have been identified where soil containing hard rubber battery casing material from the Taracorp waste pile was used as fill. These areas include 19 locations in Eagle Park Acres, one residence and 52 alleys in Venice, one location in Granite City, and two locations in Glen Carbon, Illinois.

W-C will sample and map 37 of the 52 additional alleys in Venice found to contain hard rubber battery casing material. The remaining fifteen alleys appear to be the most contaminated alleys based on a visual inspection, and will be sampled and remediated by OHM Corporation (OHM) as part of the USACE Rapid Response Program.

1.2.2.3 Main Industrial Property

The main industrial property consists of approximately 40 acres of property owned by Taracorp, Trust 454, and BV&G Transport, and is the location of a former secondary lead smelting facility (NL/Taracorp) and a battery recycling operation (St. Louis Lead Recyclers (SLLR)). Two separate waste piles, the Taracorp pile and the SLLR pile, cover portions of the site. These have a combined volume of approximately 91,000 cubic yards. Approximately 80% of the material present is blast furnace slag (O'Brien & Gere, 1988), with the remainder being a mixture of broken battery casing material, lead and iron oxide dust, and miscellaneous debris.

1.2.2.4 Boundary Definition Sampling

The data from the PDFI suggests that the extent of lead contaminated soil may extend beyond the previously defined boundaries of the impacted residential areas. To evaluate if

the boundaries need to be extended further out from the Main Industrial Site, W-C will sample a limited number of selected residential properties outside of the current study area boundaries (Figure 1-4).

1.3 PREVIOUS INVESTIGATIONS

An RI at the NL Site was completed by O'Brien and Gere in September, 1988. The extent of contamination, as defined by the RI for each of the areas of concern, is discussed in the PDFI CDAP and PDFI Final Report.

The ROD for the NL Site was issued by the United States Environmental Protection Agency (USEPA) on March 30, 1990. To adequately protect human health and the environment, the ROD requires the removal of all soils and battery casing materials with lead concentrations greater than 500 parts per million (ppm) in residential areas, the removal of all soils and battery casing material with lead concentrations greater than 1000 ppm in the industrial area, and removal of battery case material from alleys and driveways. These areas would then be restored to their original state, with the exception of remediated alleys and driveways which would be paved. The ROD requires that all of the contaminated material that is excavated either be incorporated into the main Taracorp waste pile or removed to a RCRA-compliant landfill, as appropriate. The newly created portions of the enlarged Taracorp waste pile would be provided with a bottom clay liner and would then be covered with a RCRA-compliant cap.

1.4 PROJECT PLAN

The overall objective of this project is to provide additional information not obtained during the PDFI that is necessary for the design of the remedial action for the NL Site. To accomplish this, a variety of tasks must be completed. These include field investigations on the additional residential properties, the additional remote fill areas, and the boundary definition sampling. The review and revision of the FS to reflect the results of the PDFI and this investigation will be conducted simultaneously with the additional field related tasks.

The ROD requires removal of soil from the industrial and residential areas with lead concentrations greater than 1000 and 500 ppm, respectively. The ROD also requires removal of battery case material in the industrial, residential, and remote fill areas. The soil sampling, analytical testing, and mapping efforts will attempt to delineate the vertical and areal extent of the lead contamination in these additional areas not included in the PDFI, and to refine these estimates for the adjacent residential areas. This Addendum to the CDAP discusses the activities and references the standard operating procedures that will be required to implement these tasks.

1.5 PROJECT SCHEDULE

The proposed schedule for the NL Site Project is shown in Figure 1-5. As indicated, the supplemental investigation was initiated in July, 1993 and is expected to continue until June, 1994. Anticipated milestones within the project schedule are identified in Table 1-1. Project milestones, as indicated, are typically associated with project deliverables and with the initiation or completion of major project activities.

Mobilization for most of the major site investigation activities can begin upon receipt of final approval of the Addendum to the CDAP by the USACE. The schedule anticipates that this approval will be received by mid-September, 1993. Field investigation activities are expected to extend into November, 1993. The tasks related to the review of the FS will also commence when the USACE approves this Addendum to the CDAP. This proposed schedule pursues an aggressive approach to meet overall project objectives. Attainment of these project schedule goals requires, in some cases, expedited regulatory and USEPA review.

DATA QUALITY OBJECTIVES

2.1 SITE INVESTIGATION OBJECTIVES

Additional information is required to proceed with the remedial design of the corrective action for the NL Site. Data must be developed to better estimate quantities of material that will require possible treatment as required by the ROD (USEPA, 1990). Other options for the remediation of the hard rubber battery casing material and the material contained in the piles will be evaluated.

Specific objectives of this field investigation include the following:

- Evaluate the horizontal and vertical extent of lead contamination in soil in the additional adjacent residential areas.
- Determine the lateral and vertical extent of fill containing hard rubber battery casing material in the additional remote fill locations identified by the USEPA.
- Estimate the volume of material requiring excavation and/or treatment in all the above areas.
- Submit an Addendum to the FS to reflect the additional data and information subsequent to the publication of the original FS.
- Submit a technical report on the additional field investigation summarizing the field effort, analytical results, and estimated volumes of soil requiring excavation and treatment.

2.2 DEVELOPMENT OF DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are defined as qualitative and quantitative statements which specify the quality of the data required to support decisions regarding remedial action. DQOs are determined based on the end uses of the data to be collected and, therefore, vary with each intended use. A full discussion of project DQOs is included in the PDFI CDAP.

Factors involved in the level of assessment of chemical data quality that is necessary include appropriate analytical levels, contaminants of concern, action levels, appropriate detection limits, and samples designated to be critical. The analytical level appropriate for the NL Site field investigation is Level III as described by USEPA which requires samples to be analyzed in an off-site analytical laboratory. A description of Level III is included in Section 2.0 of the PDFI CDAP. Based on previous investigations, the contaminant of concern at the NL Site for soil is lead. A detailed discussion is included in section 4.0 of the PDFI CDAP and in the Final Report on a site specific basis. The detection limit requirements are determined on a site-specific basis dependent upon the contaminants of concern and the applicable or relevant and appropriate requirements (ARARs). Details of method and site-specific detection limits are addressed in Section 7.0 of the PDFI CDAP.

2.3 QUALITY ASSURANCE OBJECTIVES

The overall QA objective for the field activities at the NL Site is to develop and implement procedures for sampling, laboratory analyses, field measurements, and reporting that provide a quality of data that is consistent with and adequate for the uses intended for that data. The sample set, chemical analytical results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the project. Quality assurance objectives for field measurement systems are also an important aspect of these investigations. These objectives for field and laboratory analytical data, as well as nonchemical data are discussed in the appropriate SOPs included in the PDFI CDAP.

2.3.1 Level of Effort

2.3.1.1 QC Effort

Field duplicates and rinsate blanks will be collected and submitted to the analytical laboratory to provide a means to assess the quality of the data resulting from the field sampling program. Field duplicate samples will be analyzed to check for sampling and laboratory reproducibility as well as analytical precision. Field blank samples will be analyzed to check for procedural contamination and cross-contamination. These blanks will be collected during the sampling effort. Matrix spike, matrix duplicate, and laboratory control samples will be analyzed to assess whether recoveries falling outside acceptance windows are attributable to sample matrix interferences (not to laboratory analytical errors), as well as to measure the accuracy of the analysis.

The general level of this QC effort for the NL Site will be a minimum of one field duplicate for every 20 investigative soil samples (5%) and a minimum of one rinsate blank for every 100 investigative soil samples (1%). The actual frequency may be higher and will be determined in accordance with site-specific objectives. One matrix spike for every 20 soil samples (5%) and one matrix duplicate sample for every 20 soil samples will be collected. The QC level of effort for the TCLP-lead analysis will be a minimum of one duplicate for every 20 soil samples selected for TCLP analysis. Matrix spike analysis will be conducted for each TCLP sample as specified in the SW-846 extraction procedures. The specific level of field QC effort is summarized in Section 4.1 for each respective site and in Tables 2-1 and 2-2.

The level of QC effort provided by the laboratory will be equivalent to the level of QC effort specified in "Test Methods for Evaluating Solid Waste", USEPA SW-846, Third Edition, 1986 as described in the Environmetrics Quality Assurance Manual (QAM) included in Appendix A. The level of QC effort required for specific analytical parameters is summarized in Table 2-3.

2.3.1.2 QA Effort

Field duplicates and rinsate blanks will be collected for specific parameters and submitted to an independent government quality assurance laboratory. The USACE Missouri River Division Laboratory (MRD) will be used for this purpose. QA samples shall be taken at the rate of at least 10 percent of the field samples taken for each matrix. The level of QA for each site is summarized in Table 2-2. USACE personnel may also be involved in general oversight of field activities as additional assurance of adherence to QA/QC protocol. The MRD LIMS number (2273 for this project) will be included on all COCs sent to the MRD Laboratory.

2.3.2 Measurement of Data Quality Objectives

Quality assurance objectives are usually expressed in terms of accuracy, precision, completeness, representativeness, and comparability. Target ranges for these parameters are established for analytical testing and field measurements prior to initiation of these activities. Any variances from the quality assurance objectives result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data in the decision making process.

A complete discussion of the measurement of Data Quality Objectives is discussed in Section 2.3 of the PDFI CDAP.

PROJECT ORGANIZATION AND RESPONSIBILITY

The organizational structure and responsibility, defined below and in Figure 3-1, is designed to provide adequate project control and proper quality assurance for site investigative activities at the NL Site. The necessary communication for project and independent review is discussed. The laboratory internal organizational structure is provided in the Laboratory Quality Management Plan in Appendix A.

3.1 RESPONSIBILITIES OF KEY PERSONNEL

3.1.1 Program Manager/Responsible Professional

The Program Manager has overall responsibility for W-C to the USACE for all activities on the project, and for monitoring the Project Manager's activities. The Program Manager has overall responsibility for the development of the Addendum to the CDAP, for monitoring the quality of the technical and managerial aspects of the project, for implementing the Addendum to the CDAP, and, where necessary, for implementing corrective measures.

3.1.2 Project Manager

The Project Manager has primary responsibility for the completion of all activities on the project. The Project Manager is responsible to the Program Manager and the USACE for day-to-day control of planning, scheduling, cost control and implementation of the project, and for the development of the Addendum to the CDAP, the technical report, and other project documents. The Project Manager monitors all project personnel in planning, coordinating, and controlling all technical aspects of the tasks.

3.1.3 Project QA/QC Officer

The QA/QC Officer reports to the Program Manager and works directly with the Project Manager and other project personnel. The QA/QC Officer has the responsibility to monitor and verify that the work is done in accordance with the CDAP, the Standard Operating Procedures, and other applicable procedures. The QA/QC Officer also has the responsibility to assess the effectiveness of the QA/QC program and to recommend modifications to the program where applicable. The QA/QC Officer is responsible for verifying that personnel assigned to the project are trained and indoctrinated relative to the requirements of the QA/QC Program. This person is also responsible for reviewing and verifying the disposition of nonconformance and corrective action reports, and for periodic quality assurance audits. The QA/QC Officer will advise the Project Manager on implementation of the QA/QC program, but the QA/QC functions of the QA/QC Officer and QA/QC representatives are independent of the Project Manager. The QA/QC Officer is responsible for coordination with the Government Quality Assurance Laboratory which has been designated as the USACE MRD.

3.1.4 Project Operations Manager

The Project Operations Manager is responsible to the Project Manager for planning, scheduling, cost control, implementation and completion of all field and related activities. The Project Operations Manager will direct and coordinate the activities of all Field Task Leaders and subcontractors to ensure that the field investigation and related activities are completed in a timely, professional manner.

3.1.5 Project Health and Safety Officer

The Project Health and Safety Officer (PHSO) reports to the Program Manager and works directly with the Project Manager and other project personnel. The PHSO operates under the direction and guidance of the W-C Regional and Corporate Health and Safety Officers, who are Certified Industrial Hygienists (CIH). The PHSO is not a CIH. The PHSO has the responsibility to monitor and verify that the work is done in accordance with the Health and

Safety Plan written for site investigations at the NL Site. The PHSO will advise the Project Manager regarding health and safety issues, but will function independently of the Project Manager. The PHSO will also designate and oversee the activities of the Site Health and Safety Officer.

3.1.6 Task Leaders

Each Task Leader is responsible to the Project Operations Manager or Project Manager for planning, scheduling, and completion of assigned project tasks. The Task Leader is responsible for implementing the QA/QC program related to their assigned tasks for the NL Site project.

3.1.7 Project Staff

Each member of the project staff is responsible to the Task Leader or Project Operations Manager for completion of assigned project activities. Members of the project staff are responsible for understanding and implementing the CDAP, Health and Safety Plan, and QA/QC program as it applies to their project activities.

3.1.8 QA/QC Coordinator

A QA/QC Coordinator will be appointed by the QA/QC Officer if deemed to be necessary with approval by the Program Manager, to review, monitor, and report on the conformance to QA/QC program requirements for specific project activities or tasks. A QA/QC Coordinator may audit activities and report to the QA/QC Officer. As QA/QC Coordinator, the designated staff member may also do project-related work, but may not do quality-monitoring on his or her own work. As a QA/QC Coordinator, the designated staff member may also advise the task group(s) on QA/QC methods and practices. The QA Coordinator will maintain a record of quality-monitoring and will inform the QA/QC Officer of these monitoring activities.

3.1.9 Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) monitors all site activities and is responsible for the implementation of and compliance with the Project Health and Safety Plan. The SHSO reports directly to the Project Health and Safety Officer.

3.2 SUBCONTRACTORS

Implementation of the CDAP will require subcontractors for:

- Laboratory chemical analysis of soil samples
- Exploratory drilling
- Surveying of boring locations and elevations

Potential subcontractors have been contacted for laboratory analysis, drilling services, and surveying. The costs for the services necessitated by this Addendum to the CDAP will be obtained from potential subcontractors prior to entering into subcontracting agreements. Qualifications of potential subcontractors are briefly described below; however, inclusion of a particular subcontractor in this document does not preclude the consideration or use of other equally or more qualified firms that are acceptable to the USACE.

3.2.1 Laboratory Analysis of Soil Samples - Environmetrics, Inc.

Environmetrics offers chemical testing services at their Maryland Heights, Missouri, location. Environmetrics participates in the USEPA Performance Evaluation Program (WS and WP) for external quality assurance and quality control and is certified by the USACE. A quality assurance/quality control program is maintained and covers all activities from sample collection through analysis and documentation to data reporting. Environmetrics's laboratory quality control management procedures are provided in Appendix A of the PDFI CDAP.

3.2.2 Drilling - Roberts Environmental Drilling, Inc.

Roberts Environmental Drilling is a drilling services company located in Columbia, Illinois, which will serve the NL Site field investigation. The company is experienced in drilling, soil sampling, and decontamination of equipment.

3.2.3 Surveying

A land surveying firm will be retained by W-C to provide surveying services to document the locations and elevations of borings drilled within the remote fill locations. All surveying activities will be supervised by a registered land surveyor.

3.3 QUALIFICATIONS OF PERSONNEL

All personnel assigned to the project, including both employees and subcontracted consultants, will have the qualifications to perform their assigned tasks.

Appraisal of the qualification of technical personnel assigned to the project will be made by the Project Manager. The appraisal will include a comparison of the requirements of the task assignment with the relevant experience and training of the prospective assignee. It will also include a determination of any additional needed training, if any. All documents concerning qualification appraisal will be stored in the project administrative files.

FIELD ACTIVITIES

Subsequent to the submittal of the PDFI Final Report (W-C, 1993) for the NL Site, additional property access was obtained and additional remote fill locations were identified. Information for the remedial design is needed for these locations. Information necessary for remedial design includes:

- Additional information regarding the horizontal and vertical extent of soil contamination in the adjacent residential areas necessary to further define or document the estimated quantities of material to be removed.
- Additional remote fill locations have been identified by USEPA where hard rubber battery casing material from the main industrial property has been used as fill. The volume of the fill material in these locations needs to be determined.
- A limited sampling program will be conducted outside of the current site boundaries to determine if additional residential areas need to be included within the site boundaries.

There are several distinct areas within the NL Site that have different data needs and therefore require different sampling approaches. These sampling areas are indicated on Figures 1-2 and 1-3. The residential area sampling will be performed using hand auger borings (HABs) and will estimate horizontal and vertical limits of soil containing lead concentrations exceeding the action level for lead specified in the ROD of 500 ppm. The remote fill location sampling will be performed using a combination of hand augers and a truck mounted drill rig and will estimate the horizontal and vertical extent of soils containing lead contamination above the ROD action level of 500 ppm, and determine the volume of hard rubber battery casing fill used in these areas. The following discussion outlines field activities associated with collecting the additional required data for compliance with the ROD. The overall sampling and analysis requirements are summarized in Tables 2-1

and 2-2. Standard Operating Procedures (SOPs) applicable to field activities associated with the NL Site supplemental investigation are included in Appendix A of the PDFI CDAP. Site safety and health requirements associated with the field activities will be conducted in accordance with the PDFI CDAP Site Safety and Health Plan (W-C, 1991).

4.1 ADJACENT RESIDENTIAL AREAS

Soil sampling will be conducted on the 129 lots where property access has been obtained since the completion of the PDFI. A list of the addresses for these properties is included in Table 4-1. Approximately two borings per lot will be completed. Exact sample locations will be determined in the field at the time of sampling as site conditions and constraints dictate. Procedures for selecting the sample locations are provided in SOP No. 9 in the PDFI CDAP. Soil samples will be collected from depth intervals of: 0 to 3 inches, 3 to 6 inches, and 6 to 12 inches. Sampling of the residential soils will take place in flat open areas that have not been tilled so that a representative soil sample is obtained. Areas that are under trees or cover will not be sampled since they may indicate an unrepresentatively low concentration of lead in the soil. Areas that are near storm water discharges or impermeable areas (i.e. asphalted areas, roofs) will not be sampled because they could show an unrepresentatively high concentration of lead.

The samples in the residential area will be obtained from hand auger borings (HABs). Sampling procedures to be followed are provided in SOPs No. 1, 5, 6, and 7 in the PDFI CDAP. Samples will be obtained at the discrete depth intervals from the auger bucket. If refusal is encountered before reaching the required depth, the HAB will be offset no more than 2 feet from the original location and a second attempt to obtain the remaining samples will be made before sampling operations are stopped at that location.

At each boring, soil collected from each sampling depth interval will be homogenized prior to filling each sample jar. These samples will then be tested for total lead concentration. Samples will not be tested for physical properties.

Prior to conducting the soil sampling in the residential area, a letter will be sent to each resident explaining the involvement of Woodward-Clyde Consultants and the time frame during which the residential soil sampling will occur for their property. The letter's format and content will be the same as that approved by the USACE, USEPA, and Illinois EPA during the PDFI.

At the request of the USEPA, approximately 41 residential properties have been selected for resampling. The same sampling procedures as described above will be followed. Approximately 174 samples will be collected and analyzed for Total Lead. A listing of addresses with a sampling breakdown for each property to be resampled is included in Table 4-2.

4.2 REMOTE FILL LOCATIONS

Numerous additional areas where material containing hard rubber battery casing material from the Taracorp waste pile was used as fill have been identified during the ongoing Rapid Response Remediation Program. These include 19 locations in Eagle Park Acres, one in Venice, one in Granite City, and two in Glen Carbon, Illinois. In addition 37 alleys in Venice that have not previously been sampled are suspected to contain the hard rubber battery casing material and will be inspected and sampled by W-C. Soil sampling for these areas will be conducted by W-C either using hand augers or a truck mounted drill rig. Fifteen additional Venice alleys with extensive contamination are being sampled and remediated by OHM as part of the USACE Rapid Response Program.

The ROD requires that the remote fill areas be tested for lead contamination where hard rubber battery case material was used as fill. The ROD requires that material in the remote fill areas with lead contamination greater than 500 ppm, with the exception of alleys and driveways which will be excavated based on visual criteria, will be backfilled with uncontaminated material, and paved.

The sampling will be conducted as described in SOPs No. 1, 5, 6 and 7 in the PDFI CDAP. If the fill material at the HAB locations is too hard to sample using a hand auger, a truck

mounted drill rig will be used. Based on previous PDFI experience, the Eagle Park Acres, Venice, and Granite City locations can probably be sampled by a W-C HAB crew. The Venice Alleys and Glen Carbon locations will probably require a drill rig.

The objective of these borings is to estimate the volume of fill that was placed in these areas. The borings will extend through the fill material and will penetrate at least 1 foot of the natural material. Samples to be analyzed for Total Lead will be collected from intervals in the boring which contain the battery casing material. TCLP-lead analysis will be conducted for samples with a lead concentration greater than 500 ppm. Approximately 540 and 160 samples will be collected and analyzed for Total Lead and TCLP Lead, respectively.

In addition to the information obtained from each boring, a visual inspection will be completed and documented in the field log book and field map to estimate the areal extent of fill at each location. Soil boring logs will be completed by a W-C geologist as described in SOP No. 5 in the PDFI CDAP.

Each boring will be located by W-C to the nearest one foot from permanent site features which will allow for later relocation of all sampling points. Vertical elevations of the borehole will not be taken. Prior to any intrusive work a utility check will be performed by W-C.

4.2.1 Soil Borings and Sampling in Eagle Park Acres

In Eagle Park Acres 18 additional lots and one alley have been identified which contain hard rubber battery casing material. The soil sampling will be conducted by W-C with a HAB crew. Each boring will extend to a depth of four feet or penetrate at least one foot beyond the hard rubber casing material fill, whichever is less. Property locations are shown in Figure 4-1 and are listed in Table 2-1.

4.2.2 Soil Borings and Sampling in the Venice Alleys

The PDFI investigated a total of five alleys in Venice that were documented to contain fill material derived from the Taracorp Pile. Subsequent to that investigation, the USEPA has identified the hard rubber battery casing material in most of the unpaved alleys in Venice. The USEPA has grouped the alleys into four categories based on visual inspection:

- **Category I:** Severe contamination requiring immediate action. These 15 alleys will be sampled and remediated by OHM as part of the ongoing USACE Rapid Response Program.
- **Category II:** Extensive hard rubber battery casing material present. These 23 alleys will be sampled by W-C as part of this investigation. Samples collected will be analyzed for Total Lead concentration and for TCLP-Lead.
- **Category III:** Scattered hard rubber battery casing material present. These 14 alleys will also be sampled by W-C as part of this investigation. Samples to be collected will be analyzed for Total Lead concentration. Those samples that are found to exceed the 500 mg/kg action level specified in the ROD will also be analyzed for TCLP-Lead.
- **Category IV:** Paved or very minor concentrations of hard rubber battery casing material noted. No action required at this time.

Since the alleys in Venice are not named, an arbitrary numbering system has been established by the USEPA. The alleys are numbered from one to seventy-two. The alley numbers and the category group each alley have been classified as is shown in Figure 4-2. Four borings will be drilled using a drill rig in each of the 23 Category II alleys. Each boring will extend to a depth of one foot below the base of obvious fill material. The presence of hard rubber battery casing material in the cuttings and samples will be noted on the drilling logs. Samples will be collected from the most visually contaminated material in each boring for the required analysis (Total lead concentration and TCLP-Lead).

The soil boring sampling locations are accessible to truck mounted drilling equipment and will be drilled with hollow stem augers. Samples will be obtained using a 2-inch OD or 3-inch OD stainless steel split spoon sampler as described in SOP No. 1 of the PDFI CDAP. Procedures for handling, storage, and disposal of soil cuttings are outlined in SOP No. 1 of the PDFI CDAP. Soil borings will be backfilled with bentonite chips upon completion as outlined in SOP No. 7 of the PDFI CDAP. Soil boring locations will be determined in the field on a site by site basis, as dictated by conditions and constraints at each locality.

Shallow samples (roughly 0 to 3 inches) for Total Lead analysis will be collected using HAB apparatus from four locations in each of the 14 Category III alleys for total lead analysis. The locations that cannot be sampled by HABs will be sampled using a drill rig. For those samples determined to have greater than 500 ppm total lead, a TCLP-Lead analysis will also be performed. Sample locations will be determined based on the visual identification of hard rubber battery casing material. All drilling and sampling will comply with the procedures and protocols described in the PDFI CDAP. A sample breakdown is included in Tables 2-1 and 2-2.

The Category II and III alleys will also be mapped by W-C personnel at this time to delineate the areal extent of the contaminated material. This information will be used in conjunction with the borings to estimate the volume of material that will require excavation and removal.

4.2.3 Soil Borings and Sampling in the Other Remote Fill Locations

The other remote fill locations which contain soil with battery casing material include 3213 Colgate Avenue, Granite City; 205 Abbott Street, Venice; 276 Collinsville Street, Glen Carbon; and Guy Street, Glen Carbon. These areas are shown in Figures 1-2 and 1-3. The Colgate and Abbott properties will be sampled by W-C with a HAB crew. At least one of the Glen Carbon properties, the Guy Street alley, will require a drill rig to conduct

the sampling. The 276 Collinsville Street location in Glen Carbon will be sampled by a W-C HAB crew. Drilling and sampling will comply with the procedures and protocols described in the PDFI CDAP. The approximate number of Total Lead and TCLP-lead samples to be analyzed are summarized in Table 2-1.

4.3 BOUNDARY DEFINITION SAMPLING

The data from the PDFI suggests that the extent of lead contaminated soil may extend beyond the previously defined boundaries of the impacted residential areas. To evaluate if the boundaries need to be extended further out from the Main Industrial Site, W-C will sample a limited number of selected residential properties outside of the current study area boundaries (Figure 4-1). The USEPA has obtained access to 28 representative properties in the north and northeast areas of Granite City that are outside of the current boundaries. W-C will use HABs to collect representative samples from the upper three inches of soil on the 28 properties. QC/QA samples will be collected in accordance with the criteria specified the PDFI CDAP. A list of the addresses for these 28 properties is included in Table 4-3.

The analytical data generated from this sampling will be incorporated into a linear regression analysis to estimate the distance from the Main Industrial Site at which soil lead levels consistently fall below the required action level of 500 ppm.

4.4 SAMPLE TRACKING SYSTEM

The purpose of the Sample Tracking System (STS) is to organize and manage the sampling process. With the CDAP and QAM as input, the STS has the ability to report holding times for each field collected analytical sample by analysis, matrix, and location. The sample tracking system also reports the required number of QA/QC samples based on the number of samples collected to date and the QAM sampling requirements.

The STS is a relational database management system; therefore, the Sampling Coordinator can perform queries on data. A unique sample ID allows for easy tracking. A sample ID is composed of the sample's matrix, location, depth, data, and type. A typical sample ID

and an explanation of the meaning of the sample ID number is provided in SOP No. 5 of the PDFI CDAP.

The STS enables the Sample Custodian to track the samples from sampling request to receipt at lab, to receipt of the laboratory results. Also, it helps the Sample Custodian to make decisions about sampling to be performed. This is based on the information entered into the database from the PDFI CDAP.

The STS reports on exceeded holding times, and for samples and the number of actual samples (sample, duplicate, field blank, matrix spike, and matrix spike duplicate) taken.

The STS can handle several rounds of data for a facility, as well as more than one lab for analysis. The ability to track re-samples is also provided. The Sampling Custodian can track the re-sample back to it's original sample.

Additional information that will be kept in the STS includes time of the sampling event, samplers' initials, requested analysis, comment, cooler number, shipment date, and chain of custody date.

4.5 FIELD CORRECTIVE ACTION

Any and all nonconformances with the established quality control procedures will be expeditiously identified and controlled. The USACE project manager is to be notified of any nonconformances within 48 hours after they have been identified. No additional work which is dependent on the nonconforming activity will be allowed until the identified nonconformance is corrected.

5.0

RE-EVALUATION OF THE FEASIBILITY STUDY AND RECORD OF DECISION

Additional activities are required to be conducted concurrent with the initial stages of the Supplemental Field Investigation. The purpose of these activities is to generate an Addendum to the FS which will identify, evaluate, and rank treatment and disposal options on the basis of project specific response performance criteria for waste pile material, contaminated soil, and contaminated groundwater. An analysis of alternatives for remediation of lesser contaminated battery chip areas will also be included. This analysis will include a recommended cutoff concentration for lead above which rapid response action is required. A flowchart outlining the steps involved in the reevaluation of the FS is included as Figure 5-1. These additional activities include the following:

5.1 DEVELOPMENT OF RESPONSE PERFORMANCE CRITERIA

Based on the reassessment of the site characterization, response performance criteria will be developed. These response performance criteria will be required to evaluate the remediation, removal, and disposal of affected media. The criteria will define method standards which will be used to evaluate the alternative methods that can satisfy the remedial action objectives for the site. These criteria are required to accomplish the remediation, and/or removal and disposal of these media. A draft of the response performance criteria would be developed for review by USACE, USEPA, and IEPA.

5.2 IDENTIFICATION AND SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Treatment and disposal technologies that could potentially meet the response performance criteria for the piles, hard rubber battery casing materials, and contaminated groundwater will be identified and studied. Potentially viable existing alternatives and approaches will be included, as well as applicable innovative remedial technologies that have been identified. Potential remediation contractors will be interviewed concerning specific remediation

technologies and approaches. A screening process will be developed that evaluates the technical feasibility of each technology or approach with regard to the established performance criteria for each media. For those technologies and approaches that appear feasible, prospective contractors will be invited to demonstrate the effectiveness related to established performance criteria of their respective techniques. This could include results of bench scale testing of representative material from the site if potential contractors deem such tests necessary.

5.3 RANKING OF TECHNOLOGIES

The viable treatment and disposal technologies that are identified will next be evaluated in terms of response performance criteria with regard to effectiveness, implementability, and cost. This evaluation will be based in part on information provided by potential contractors which could include the results of bench scale testing. The end result will be a ranking of potentially viable technologies for each media. Representative processes from selected technologies will be included for consideration.

5.4 DEVELOPMENT AND SCREENING OF ALTERNATIVES

Specific technologies will next be combined into media specific alternatives for the piles, contaminated soil, and contaminated groundwater. These alternatives will be assembled to meet the remedial action objectives for each media. Additional contractor input, if deemed necessary, will be sought to demonstrate which alternatives will potentially be the most effective. Our analysis will provide sufficient information to allow differentiation among alternatives with respect to effectiveness, implementability, and cost.

Based on the site characterization and response performance criteria, the media specific alternatives will be screened to provide appropriate waste management options that ensure the protection of human health and the environment. For those areas containing fill material contaminated with hard rubber battery casing material. This analysis will include a recommended cut off concentration for lead above which a rapid response action will be required.

5.5 COMPARATIVE ANALYSIS OF ALTERNATIVES

After the alternatives have been individually assessed, a comparative analysis will be conducted to evaluate the relative performance of each alternative with respect to the performance response criteria and the remedial action objectives. The comparative analysis will identify the advantages and disadvantages of each alternative relative to one another. For an alternative to be eligible for selection, it must provide overall protection of human health and the environment, provide compliance with ARARs, and meet the performance response criteria. The end result will be a ranking of potentially viable alternatives for each media. The analysis will provide sufficient information to allow differentiation among alternatives with respect to effectiveness, implementability, and cost.

6.0

SAMPLE IDENTIFICATION, HANDLING, AND DOCUMENTATION

The samples will be collected into pre-washed and quality controlled containers provided by the laboratory. Specific analytical parameters and methods, containers, sample quantities and holding times are shown in Table 6-1. Procedures pertaining to this section include the following SOPs included in the PDFI CDAP: SOP No. 1 (Soil Sampling), SOP No. 5 (Sample Identification, Handling, Shipping, and Documentation), and SOP No. 6 (Decontamination).

6.1 SAMPLE LABELING

A sample numbering system will provide a tracking mechanism to allow information retrieval concerning samples and sampling locations. A unique sample number will be assigned to each sample. Procedures for this system are provided in SOP No. 5 of the PDFI CDAP.

6.2 CHAIN-OF-CUSTODY PROTOCOL

6.2.1 Field

The primary purpose of the COC procedures is to document the possession of the samples from collection to storage, analysis, and disposal. COC forms will become the permanent records for all sample handling and shipment. The Field Task Leader or their designee will be responsible to the Project Operations Manager for monitoring compliance with COC procedures. Each cooler containing samples sent to the analytical laboratory will be accompanied by a chain-of-custody (COC) record. The procedures utilizing COC protocols are detailed in Section 6.2 of the PDFI CDAP.

6.2.2 Laboratory

Laboratory chain-of-custody, sample storage, and dispersement for analysis and associated documentation are found in the Environmetrics QAM (Appendix A).

6.3 PACKAGING AND SHIPPING

Appropriate procedures and safeguards shall be used for all sample packaging and shipping activities. These procedures, described in SOP No. 5 of the PDFI CDAP (sample identification, handling, and documentation), shall be followed to ensure the integrity of all samples shipped for laboratory analysis. All samples will be shipped the same day collected. Samples will be either hand delivered or shipped to the laboratory via an overnight air express carrier. Upon arrival in the laboratory, samples will be checked in by the Laboratory Sample Custodian.

LABORATORY ANALYTICAL PROCEDURES

The general laboratory procedures anticipated for the supplemental investigation at the NL Site are summarized in Table 7-1. The specific analyses required for each sampling area are explained in Section 4.2. Method-specific data quality objectives that are applicable to laboratory procedures are specified in Table 2-3. Specific laboratory practices for the methods listed below including sample preparation, sample tracking and documentation are provided in the Environmetrics QAM (Appendix A).

7.1 SOIL ANALYSIS FOR LEAD

7.1.1 Lab Methodology

Soil samples collected from the NL Site will be analyzed for total lead concentration by SW-846 Methods 3050/6010. Selected samples will also be analyzed for leachable lead using the Toxicity Characteristic Leaching Procedure (TCLP), SW-846 Methods 1311/3010/6010.

The necessary sensitivity and detection limits will be achieved by using the inductively coupled argon plasma spectrometry (ICP) instrumentation. Summaries of analytical methodology and reporting limits are provided in Tables 7-1, respectively. All soil sample analyses will be conducted by Environmetrics in accordance with the appropriate laboratory SOPs and the Environmetrics QAM (Appendix A).

7.1.2 Method Specific Data Quality Objectives

The analytical method specific DQOs for NL Site soil samples are precision, accuracy, and sensitivity criteria. The QA objective is to achieve the QC acceptance criteria required by the analytical protocols. In general, the precision, accuracy and sensitivity criteria and methods are those stipulated by SW-846. A detailed discussion of the method specific data quality objectives can be found in Section 7 of the PDFI CDAP.

7.1.3 Preventative Maintenance

The laboratory is responsible for the maintenance of its laboratory equipment. Preventive maintenance will be provided on a scheduled basis to minimize interruption of analytical work. All instruments will be maintained and serviced in accordance with manufacturer's recommendations and normal approved laboratory practice.

Designated laboratory personnel will be trained in routine maintenance procedures for all major instrumentation. When repairs become necessary, they will be made by either trained staff or trained service technicians. The laboratory shall have in place a contingency plan in the event of an equipment failure. All maintenance will be documented and kept in permanent logs. These logs will be available for review by auditing personnel.

Both scheduled and unscheduled maintenance required by operational failures will be recorded. The designated laboratory operations coordinator will review maintenance records on a regular basis to ensure that required maintenance is occurring. Details of these procedures are provided in the Environmetrics QAM (Appendix A).

7.1.4 Calibration and Frequency

Total lead analysis of soil samples from the NL Site will involve the ICP analytical instrument. Each ICP unit is calibrated prior to the analyses being performed using criteria prescribed in the appropriate laboratory SOP. The calibration is then verified using standards from an independent source. The linear range of the instrument is established using a linear range verification standard. No values are reported above this upper concentration value without dilution. Frequency of calibration is summarized in Table 2-3.

A calibration curve is established daily by analyzing a minimum of two standards, one of which is a calibration blank. An interference check standard is analyzed at the beginning of each analytical run to verify that inter-element and background correction factors have remained constant. Results outside of the established criteria trigger reanalysis of samples.

INTERNAL QUALITY CONTROL CHECKS

9.1 FIELD QC CHECKS

Field quality control checks will include the review and approval of all field documentation by the Field Task Leader or his or her designee. Signature or initial approval will indicate that the provisions outlined in the PDFI CDAP, the Addendum to the CDAP, and SSHP have been appropriately implemented.

In addition the Field Task Leader will perform random spot checks on the field team(s) on a daily basis. Conformance with established procedures will be checked and documented in the field logbook. Nonconformances will be corrected and reported to the Project Manager orally, followed by a written memo for inclusion into the project file. Samples identified as nonconforming will be disposed of and new samples obtained. In the event that a serious deficiency (nonconformance) is identified, the sampling team's prior work will also be reviewed.

Field rinsate blanks will be collected as field QC checks. Field rinsate blanks are check samples which monitor contamination associated with the sample collection and decontamination. Field rinsate blanks will be collected as indicated in Table 2-2. The field rinsate blanks will consist of analyte-free deionized water.

Field duplicates will be collected and submitted to the analytical laboratory to assess sampling and laboratory reproducibility and representativeness. A minimum of one field duplicate for every 20 investigative soil samples (5%) will be collected.

9.2 LABORATORY QC CHECKS

There are two types of quality assurance methodologies used to ensure the production of analytical data of known and documented useable quality: Program quality assurance and analytical method quality control.

The laboratory has a written Quality Assurance/Quality Control program which provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA/QC program is coordinated and monitored by the laboratory Quality Assurance Unit (QAU), which is independent of the operating departments.

The stated objectives of the laboratory QA/QC program are to:

- Ensure that all procedures are documented, including any changes in administrative and/or technical procedures.
- Ensure that all analytical procedures are conducted according to sound scientific principles and have been validated.
- Monitor the performance of the laboratory by a systematic inspection program and provide for corrective action as necessary.
- Collaborate with other laboratories in establishing quality levels, as appropriate.
- Ensure that all data are properly recorded and archived.

All laboratory procedures are documented in writing as either SOPs or Method Procedures (MPs) which are edited and controlled by the QAU. Internal quality control procedures for analytical services will be conducted by the laboratory in accordance with their standard operating procedures. The analytical method requirements for Environmetrics will be in a manner consistent with the SW-846. These specifications include the types of audits required (sample spikes, reference samples, controls, blanks), the frequency of each audit, the

7.1.5 Corrective Action

The laboratory department supervisors will review the data generated to verify that all quality control samples have been run as specified in the protocol. Recoveries of matrix spike samples, for consistency with method accuracy, and matrix spike duplicate samples, for method precision, will be evaluated using the data quality goals discussed in Section 7.1.2. Data from the laboratory control samples will be evaluated according to the Environmetrics QAM (Appendix A). Analytical data generated with laboratory control samples which fall within the established control limits are judged to be in control. Data generated with laboratory control samples that do not fall within control limits are considered suspect, and the sample analysis is repeated or sample results are reported with qualifiers if this is not possible.

Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy established for laboratory control samples.
- Blanks contain contaminants at concentrations above the levels specified in the Environmetrics QAM for any target compound.
- Undesirable trends are detected in matrix spike recoveries or relative percent difference (RPD) between matrix spike duplicates.
- There are unusual changes in detection limits.
- Deficiencies are detected by the laboratory QA director during internal or external audits, or from the results of performance evaluation samples.

If any nonconformances in analytical methodologies, quality control sample results, etc., are identified by the bench analyst, corrective actions will be implemented immediately. Corrective action procedures will be handled initially at the bench level by the analyst, who

will review the preparation or extraction procedure for possible errors, check the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. The analyst will immediately notify his/her supervisor as to the problem that is identified and the investigation which is being made. If the problem persists or cannot be identified, the matter will be referred to the laboratory supervisor and Program Administrator (PA) for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the laboratory PA and the QA/QC Officer is provided a corrective action memo for inclusion into the project file if data are affected.

Corrective action may include, but will not be limited to:

- Reanalyzing suspect samples
- Resampling and analyzing new samples
- Evaluating and amending sampling and/or analytical procedures
- Accepting data with an acknowledged level of uncertainty
- Recalibrating analytical instruments
- Discarding the data

Data deemed unacceptable following the implementation of the required corrective action measures will not be accepted by the Project Manager and follow-up corrective actions will be explored. Details of laboratory corrective actions are provided in the Environmetrics QAM in Appendix A.

DATA REDUCTION, VALIDATION, AND REPORTING

The analytical data generated by the analytical laboratory will be checked for accuracy and completeness. The data validation process for this project will consist of data generation, reduction, and three levels of review.

The first level of review will be conducted by the analytical laboratory which has the initial responsibility for the correctness and completeness of the data. All data are generated and reduced following guidelines specified in the Environmetrics QAM (Appendix A). The laboratory will evaluate the quality of the work based on an established set of laboratory guidelines.

The second level of review will be performed by a W-C data review specialist whose function is to provide an independent validation of the laboratory data package. The validation process will be conducted according to an established set of guidelines entitled "Guidelines for Non-CLP Chemical Data Evaluation" (USEPA, 1988).

The third level of review will be conducted by the W-C Project QA/QC Officer or his/her representative who will randomly audit representative project data packages.

A detailed discussion of Data Reduction, Validation, and Reporting can be found in Section 8.0 of the PDFI CDAP.

compounds to be used for spikes and surrogate spikes, and the quality control acceptance criteria for these audits.

The Laboratory will document, in each data package provided, that analytical QC functions have been met. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory if the laboratory procedures were not in control as assessed by laboratory control samples and other data specific to the analysis, and if sufficient sample volume is available. QC check samples analyzed (method blank, field blank, etc) will be run concurrently with the sample batch (maximum of 20 environmental samples) to which they are assigned. Method blanks will be analyzed at a rate of 1 in 20. Field blanks will be analyzed at a rate of 1 in 10 for water samples.

9.2.1 Matrix Duplicate

A matrix duplicate (laboratory replicate) is an environmental sample which is divided into two separate aliquots. The aliquots are processed separately and the results compared to evaluate the effects of the matrix on the precision of the analysis. Results are expressed as relative percent difference (RPD) between the duplicate aliquots analyzed. Matrix duplicate analysis will take place at a rate of 1 per batch of 20 (5%) soil samples analyzed.

9.2.2 Matrix Spike

A matrix spike is an environmental sample to which known concentrations of analytes have been added. The matrix spike is taken through the entire analytical procedure and the recovery of analytes calculated. Results are expressed as percent recovery of the known amount spiked. The matrix spike is used to evaluate the effect of the sample matrix on the accuracy of the analysis. Matrix spike analysis will be conducted at a rate of 1 per batch of 20 (5%) soil samples. Extra sample volume will be collected for matrix spike samples.

9.2.3 Method Blank

A method blank consists of analyte-free deionized water. The method blank is carried through each step of the analytical method. Method blanks will be analyzed at a rate of one per batch of 20 (5 %) environmental samples analyzed.

10.0

PERFORMANCE AND SYSTEMS AUDITS

Performance and systems audits conducted by W-C shall be performed to (1) determine that the QA program has been documented in accordance with specified requirements, (2) verify by examination and evaluation of objective evidence that the documented program has been implemented, (3) assess the effectiveness of the quality assurance project plan, (4) identify any nonconformances, and (5) verify correction of identified deficiencies.

The W-C Project QA/QC Officer (QA/QC Officer) shall be responsible for initiating audits, selecting the audit team and overseeing the audit implementation. The QA/QC Officer in consultation with the Project Manager, shall perform audits to coincide with appropriate activities on this project. A detailed discussion of Performance and Systems Audits can be found in Section 10 of the PDFI CDAP.

**11.0
DELIVERABLES**

11.1 DAILY QUALITY CONTROL REPORTS (DQCR)

During the field investigation, W-C will provide Daily Quality Control Reports (DQCR) to the USACE. These reports will include the information found in the USACE ER-1110-1-263 Chemical Data Quality Management for Hazardous Waste Remedial Activities, October 1, 1990. These reports will be compiled and sent to the USACE PM once every week (along with the weekly confirmation notice package). Should problems arise, W-C will notify the USACE PM immediately and send the DQCR by express mail on a daily basis until the problem has been corrected. An example DQCR is included in SOP No. 5 of the PDFI CDAP.

11.2 QUALITY CONTROL SUMMARY REPORT (QCSR)

A report will be submitted by W-C at the conclusion of the PDFI. The QCSR will contain, but not be limited to, the following information.

- 1) Project Description. This will include organization and site description.
- 2) Laboratory QC Activities. This will include a summary of planned laboratory QC activities, a summary of any deviations from planned activities and a summary of the evaluation of the data quality for each analysis and matrix.
- 3) Field QC Activities. This will include a summary of planned field QC activities, a summary of any deviations from planned activities, and a summary of the evaluation of the quality of the sampling.

- 4) **Data Presentation and Evaluation.** This will include an assessment of sampling and analysis techniques, an evaluation of data quality of each matrix and parameter, and an evaluation of the usability of the data.
- 5) **Lessons Learned.** This will summarize any suggested changes to field or analytical procedures that could be made to better characterize chemical contamination in future work efforts.
- 6) **DQCR Consolidation.** All DQCR's will be consolidated and summarized.

11.3 ANALYTICAL REPORTS

All laboratory analytical reports will follow the same format. Analyses will typically be grouped, by the date the sample was received by the laboratory. In general, a typical analytical report will include:

- 1) **General Discussion:** This will include a description of sample types, tests performed, any problems encountered, and any general comments.
- 2) **Analytical Data:** Data are reported by sample or by test. All pertinent dates, information and reporting limits are also included.
- 3) **QC Information:** All pertinent QC information, including laboratory control samples, method blanks, matrix spikes, matrix duplicates, and field duplicates will be included.
- 4) **Methodology:** Reference for analytical methodology used is cited.
- 5) **Custom Services:** Any requested special services are included.

11.4 ADDENDUM TO THE FEASIBILITY STUDY

Based on the results of the tasks discussed in Section 5, recommendations will be compiled on the basis of performance criteria and media specific alternatives that meet the response performance criteria. These recommendations will be incorporated into the draft Addendum to the FS (Addendum). A draft Addendum will be submitted to the USEPA, IEPA, and USACE in early January, 1994. The draft Addendum will adhere to the format and content outlined in USEPA/540/G-89/004. A total of fifteen copies of the draft Addendum shall be submitted.

Upon receipt of agency comments, it is anticipated that a conference call will be scheduled to discuss the comments and potential resolutions to any deficiencies identified. Following the review conference call, the resolved comments will be incorporated into the draft FS Addendum and a final FS Addendum prepared. This document will be transmitted to the appropriate federal, state, and local agencies.

11.5 SITE INVESTIGATION REPORTS

A preliminary data submittal for the additional Remote Fill Areas sampled by this investigation will be submitted to the USEPA, IEPA, and USACE after completion of laboratory testing and data validation. We anticipate a delivery date in early January, 1994.

A draft technical report summarizing the sampling activities and analysis results will be submitted to the USEPA, IEPA, and USACE within 60 days of the completion of laboratory testing. A total of fifteen copies of the draft technical report will be submitted. The draft technical report will include a project Quality Control Summary Report (QCSR) as required by the USACE.

**Woodward-Clyde
Consultants**

Upon receipt of agency comments, it is anticipated that a conference call will be scheduled to discuss the comments and potential resolutions to any deficiencies identified. Following the review meeting, the resolved comments will be incorporated into the draft report and a final report prepared. This document will be transmitted to the appropriate federal, state, and local agencies.

TABLES

TABLE 1-1

PROJECT MILESTONES

Project Milestones	Date
Submit Draft Addendum to PDFI CDAP	August, 1993
Submit Final Addendum to PDFI CDAP	September, 1993
Initiate Supplemental Field Work	September, 1993
Complete Supplemental Field Work	November, 1993
Complete Analytical Testing	November, 1993
Complete Data Validation	November, 1993
Submit Data For Remote Fill Areas	January, 1994
Submit Draft Addendum to Feasibility Study	January, 1994
Submit Draft Technical Report	March, 1994
Submit Final Addendum to Feasibility Study	March, 1994
Submit Final Technical Report	May, 1994
Final Review with USACE	June, 1994

TABLE 2-1

**SAMPLING LOCATION AND ANALYSIS SUMMARY
NL/TARACORP SUPERFUND SITE**

LOCATION	HAND AUGER BORINGS	DRILL RIG BORINGS	TOTAL LEAD	TCLP LEAD
ADJACENT RESIDENTIAL	258	0	774	0
ADJACENT RESIDENTIAL RESAMPLING	68	0	194	0
REMOTE FILL: VENICE ALLEYS	56	92	148	106
EAGLE PARK ACRES:				
104 CARVER	8	0	16	4
125 CARVER	6	0	12	3
126 CARVER (1)	6	0	12	3
212 CARVER (2)	4	0	8	2
WATSON ALLEY	8	0	16	4
211 WATSON (2)	4	0	8	2
212 WATSON (2)	4	0	8	2
213 WATSON (2)	4	0	8	2
214 WATSON (2)	4	0	8	2
217 WATSON (2)	4	0	8	2
219 WATSON (2)	4	0	8	2
123 BOOKER	4	0	8	2
95 HILL (2)	4	0	8	2
209 HILL (2)	4	0	8	2
211 HILL	7	0	14	3
212 HILL (2)	4	0	8	2
202 TERRY (2)	4	0	8	2
204 TERRY (2)	4	0	8	2
101 HARRISON (2)	4	0	8	2
OTHER REMOTE FILL:				
3213 COLGATE (2)	4	0	8	2
205 ABBOTT (2)	4	0	8	2
GLEN CARBON ALLEY	0	8	16	4
276 COLLINSVILLE STREET	4	0	4	1
BOUNDARY SAMPLING	28	0	28	0
PROJECT TOTALS (3)	513	100	1362	160

(1) TCLP ONLY IF TOTAL LEAD CONCENTRATION > 500 PPM

(2) ANALYSES CONDUCTED ONLY IF VISIBLE BATTERY CHIPS PRESENT IN BORING

(3) SAMPLE TOTALS DO NOT INCLUDE QC/QA SAMPLES

TABLE 2-2

**SAMPLE DISTRIBUTION AND QUALITY CONTROL / QUALITY ASSURANCE SUMMARY
NL / TARACORP SUPERFUND SITE**

LOCATION	TOTAL LEAD SAMPLES	QUALITY CONTROL				TCLP-LEAD SAMPLES *	W - C TOTAL	QUALITY ASSURANCE TOTAL **
		RINSATE BLANK	FIELD DUPLICATE	MATRIX SPIKE	MATRIX DUPLICATE			
ADJACENT RESIDENTIAL	774	8	39	39	39	0	899	78***
ADJACENT RESIDENTIAL RESAMPLING	194	2	10	10	10	0	226	19
REMOTE FILL:								
VENICE ALLEYS	148	1	7	8	8	106	278	15
EAGLE PARK ACRES	182	2	9	9	9	45	256	18
OTHER REMOTE FILL:								
3213 COLGATE	8	0	1	0	0	2	11	1
205 ABBOTT	8	0	1	1	1	2	13	1
GLEN CARBON ALLEY	16	0	1	1	1	4	23	2
276 COLLINSVILLE STREET	4	0	0	0	0	1		
BOUNDARY SAMPLING	28	1	2	2	2	0	35	3
PROJECT TOTALS	1362	14	70	70	70	160	1741	137

* TCLP-lead will be analyzed for selected total lead samples with concentrations > 500 ppm. The percent frequency of QC samples to be analyzed does not include the TCLP samples, QC for TCLP analysis will include matrix spike for each sample and an extraction blank at 5 % frequency.

** Quality Assurance analyses to be performed by USACE MRD Laboratory in Omaha, NE.

*** This QA total includes one rinsate blank sample.

TABLE 2-3

**LABORATORY QC LEVEL OF EFFORT FOR ANALYTICAL TESTING
NL/TARACORP SUPERFUND SITE**

<u>SOIL ANALYSES</u>			
<u>Parameters</u>	<u>Audit</u>		<u>Frequency⁽¹⁾</u>
Total Lead (ICP)	Initial and Continuing Calibration	Verification	Daily and each instrument setup
	Laboratory Control Sample		One per batch or one per 20 samples
	Matrix Spike Analysis		One per batch or one per 20 samples
	Laboratory Replicate (Matrix Duplicate)		One per batch or one per 20 samples
TCLP - Lead	Laboratory Control Sample		One per batch or one per 20 samples
	Matrix Method Analysis		One per batch or one per 20 samples
	ICP QC level of effort. Same as above for total lead.		

Note:

- (1) QC audits are to be performed at most frequent interval specified.
TCLP Toxicity Characteristics Leachate Procedure
ICP Inductively Coupled Argon Plasma

**TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS**

SAM SKINNER
1915 BENTON ST
GRANITE CITY, IL 2040

RUBIN SCHONE
1726 CHESTNUT ST
GRANITE CITY, IL 62040

JAMES STUART
2265 CLEVELAND BLVD
GRANITE CITY, IL 62040

GEORGE PASAN
1708 DELMAR AVE
GRANITE CITY, IL 62040

RESIDENT
1714 DELMAR AVE
GRANITE CITY, IL 62040

JOHN ROYCE
2100 DELMAR AVE
GRANITE CITY, IL 62040

GRANVILLE WELCH
2121 DELMAR AVE
GRANITE CITY, IL 62040

OSWALD BERENDT
2138 DELMAR AVE
GRANITE CITY, IL 62040

RESIDENT
2149 DELMAR AVE
GRANITE CITY, IL 62040

BEVERLY SCHUTZENHOFER
2201 DELMAR AVE
GRANITE CITY, IL 62040

RALPH E WALDEN SR
2225 DELMAR AVE
GRANITE CITY, IL 62040

RESIDENT
2228 DELMAR AVE
GRANITE CITY, IL 62040

GARY SIPOLE
2251 DELMAR AVE
GRANITE CITY, IL 62040

RESIDENT
1712 EDISON
GRANITE CITY, IL 62040

RESIDENT
1728 EDISON
GRANITE CITY, IL 62040

RESIDENT
1743 EDISON
GRANITE CITY, IL 62040

ANDREW GASPAROVIC JR
2150 EDISON AVE
GRANITE CITY, IL 62040

MARY ALLEN
2251 EDISON AVE
GRANITE CITY, IL 62040

DAVID GEGGUS
2265 EDISON AVE
GRANITE CITY, IL 62040

BOB MILANKOVIC
1413 GRAND
GRANITE CITY, IL 62040

TONY VAVRA
1417 GRAND
GRANITE CITY, IL 62040

RESIDENT
2013 GRAND AVE
GRANITE CITY, IL 62040

MARY THEABEAU
2121 GRAND AVE
GRANITE CITY, IL 62040

MARBLE JOHNSON
2129 GRAND AVE
GRANITE CITY, IL 62040

**TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS**

JAMES E. WALKER
2203 GRAND AVE
GRANITE CITY, IL 62040

DAVID KELLEY
2205 GRAND AVE
GRANITE CITY, IL 62040

THEODORE MORAN
2208 GRAND AVE
GRANITE CITY, IL 62040

DOROTHY CONRAD
2229 GRAND AVE
GRANITE CITY, IL 62040

BETTY MCCLEARY
2252 GRAND AVE
GRANITE CITY, IL 62040

RESIDENT
2259 GRAND AVE
GRANITE CITY, IL 62040

MARY DIAK
1404 IOWA
GRANITE CITY, IL 62040

RICHARD W FERRIS
1417 IOWA ST
GRANITE CITY, IL 62040

THOMAS PLESE
1427 IOWA ST
GRANITE CITY, IL 62040

EDWARD G ROOT
2257 IOWA ST
GRANITE CITY, IL 62040

JAMES S NAGY
2041 LEE AVE
GRANITE CITY, IL 62040

TOM WITT
1441 MADISON
GRANITE CITY, IL 62040

SHARON HERRON
2229 MADISON AVE
GRANITE CITY, IL 62040

RESIDENT
2231 MADISON AVE
GRANITE CITY, IL 62040

RICHARD KISMER
2233 MADISON AVE
GRANITE CITY, IL 62040

STEVEN KING
2235 MADISON AVE
GRANITE CITY, IL 62040

MARIE JEZIORO
1637 OLIVE ST
GRANITE CITY, IL 62040

ANITA O'HARA
1737 OLIVE ST
GRANITE CITY, IL 62040

HERSHEL L CONLEY
1748 OLIVE ST
GRANITE CITY, IL 62040

HERSHEL L CONLEY
1750 OLIVE ST
GRANITE CITY, IL 62040

MAUREEN SZUCS
1622 SPRUCE ST
GRANITE CITY, IL 62040

JOHN SZUCS
1630 SPRUCE ST
GRANITE CITY, IL 62040

RICHARD PARIZON
1716 SPRUCE ST
GRANITE CITY, IL 62040

RESIDENT
1740 SPRUCE ST
GRANITE CITY, IL 62040

**TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS**

RESIDENT
1638 STATE
GRANITE CITY, IL 62040

REYMUNDO LOPEZ
1712 STATE
GRANITE CITY, IL 62040

RESIDENT
1713 STATE
GRANITE CITY, IL 62040

PAUL NASH
1717 STATE
GRANITE CITY, IL 62040

VACANT LOT
1721 STATE
GRANITE CITY, IL 62040

VACANT LOT
1814 STATE
GRANITE CITY, IL 62040

PHILIP S JOHNSON
2049 STATE ST
GRANITE CITY, IL 62040

GENEVIEVE BEASLEY
2123 STATE ST
GRANITE CITY, IL 62040

JEANETTE MULLEN
2134 STATE ST
GRANITE CITY, IL 62040

HARRISON MULLEN
2138 STATE ST
GRANITE CITY, IL 62040

RESIDENT
2141 STATE ST
GRANITE CITY, IL 62040

KENNETH D HARPER
2142 STATE ST
GRANITE CITY, IL 62040

NELSON D. DUNLAP
2200 STATE ST
GRANITE CITY, IL 62040

JANICE WALKER
2215 STATE ST
GRANITE CITY, IL 62040

ALBERT CARPENTER
2234 STATE ST
GRANITE CITY, IL 62040

CALVIN BARTON
1725 WASHINGTON AVE
GRANITE CITY, IL 62040

ANN BARKO
1727 WALNUT ST
GRANITE CITY, IL 62040

RESIDENT
2004 WASHINGTON
GRANITE CITY, IL 62040

WALTER WALIGORSKI
2114 WASHINGTON
GRANITE CITY, IL 62040

EDWARD KESSLER
2502 W 20TH ST
GRANITE CITY, IL 62040

KEN SABLE
1026 ALTON
MADISON, IL 62060

GARY DUDEK
1855 EDWARDSVILLE ROAD
MADISON, IL 62060

VACANT LOT
1865 EDWARDSVILLE RD
MADISON, IL 62060

RESIDENT
1871 EDWARDSVILLE ROAD
MADISON, IL 62060

**TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS**

RESIDENT
907 GRAND AVE
MADISON, IL 62060

RESIDENT
1008 GRAND AVE
MADISON, IL 62060

HELEN MANGOFF
1024 GRAND AVE
MADISON, IL 62060

RESIDENT
1206 GRAND AVE
MADISON, IL 62060

CARL MAZNOZE
1212 GRAND
MADISON, IL 62060

WILLIAM HOOVER
1226 GRAND AVE
MADISON, IL 62060

MICHAEL ECONOMY
1306 GRAND AVE
MADISON, IL 62060

VACANT LOT
1329 GRAND AVE
MADISON, IL 62060

ROBERT VAUGHN
1347 GRAND AVE
MADISON, IL 62060

RESIDENT
900 GREENWOOD
MADISON, IL 62060

JOHNNIE FLOWERS
1004 GREENWOOD
MADISON, IL 62060

BETTY J MCCOY
1005 GREENWOOD
MADISON, IL 62060

RESIDENT
1038 GREENWOOD
MADISON, IL 62060

RESIDENT
1104 GREENWOOD
MADISON, IL 62060

LYNN BARNHART
819 IOWA ST
MADISON, IL 62060

FRANCES BLINCOE
821 IOWA ST
MADISON, IL 62060

THERESA WILGATEK
905 IOWA ST
MADISON, IL 62060

JOHN SEVERINE
919 IOWA ST
MADISON, IL 62060

GEORGE DORSTE
1109 IOWA ST
MADISON, IL 62060

CHARLES DORSTE
1115 IOWA ST
MADISON, IL 62060

GARY HOLMAN
1117 IOWA ST
MADISON, IL 62060

JOHN PHILLIPS
1216 IOWA ST
MADISON, IL 62060

JOHN JAMES
1305 IOWA
MADISON, IL 62060

KARRY WILLIAMSON
1603 KENNEDY
MADISON, IL 62060

TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS

GARY CHANDLER
1013 MADISON AVE
MADISON, IL 62060

RESIDENT
1023 MADISON AVE
MADISON, IL 62060

RESIDENT
1103 MADISON AVE
MADISON, IL 62060

RESIDENT
1109 MADISON AVE
MADISON, IL 62060

CINDY VIHYSACK
1111 MADISON AVE
MADISON, IL 62060

RESIDENT
1126 MADISON
MADISON, IL 62060

DAVE SCHERMER
1200 MADISON
MADISON, IL 62060

RESIDENT
1225 MADISON AVE
MADISON, IL 62060

RESIDENT
1329 MADISON
MADISON, IL 62060

JOHN MUCHO, SR
1333 MADISON AVE
MADISON, IL 62060

GLENWOOD MELL
1025 MCCAMBRIDGE
MADISON, IL 62060

ROBERT COONROD
1119 MCCAMBRIDGE
MADISON, IL 62060

RESIDENT
624 MEREDOCIA AVE
MADISON, IL 62060

RESIDENT
925 REYNOLDS
MADISON, IL 62060

BILL MUSE
1004 REYNOLDS
MADISON, IL 62060

TIMOTHY LOFINK
1008 REYNOLDS
MADISON, IL 62060

EDWARD PRUSAK
1121 REYNOLDS
MADISON, IL 62060

WILLIAM BURRIS
1122 REYNOLDS
MADISON, IL 62060

RESIDENT
601 SALVETER
MADISON, IL 62060

VACANT LOT
625 SALVETER
MADISON, IL 62060

EUGENIA KEENE
645 SALVETER
MADISON, IL 62060

GROVER BRANNAM
1200 STATE ST
MADISON, IL 62060

RESIDENT
1342 STATE ST
MADISON, IL 62060

FRADA CLIFTON
1518 12TH ST
MADISON, IL 62060

TABLE 4-1
UNSAMPLED RESIDENTIAL LOTS

THERESA BURDEN
1520 12TH ST
MADISON, IL 62060

BONNIE CAMPBELL
815 WASHINGTON AVE
MADISON, IL 62060

RESIDENT
913 WASHINGTON AVE
MADISON, IL 62060

WILLIAM SANDOR
1011 WASHINGTON AVE
MADISON, IL 62060

LOUIS PETROSKY
1033 WASHINGTON AVE
MADISON, IL 62060

RICHARD AMBERGER
1047 WASHINGTON
MADISON, IL 62060

JOHN MAJESKI
1231 WASHINGTON
MADISON, IL 62060

GEORGE VASILOFF
1310 WASHINGTON AVE
MADISON, IL 62060

JOSEPH BUDDE
1315 WASHINGTON AVE
MADISON, IL 62060

**TABLE 4-2
RESIDENTIAL LOTS TO BE RESAMPLED**

LOUIS VERNON
2028 BENTON ST
GRANITE CITY, IL 62040

SHIRLEE BYRD
2153 BENTON AVE
GRANITE CITY, IL 62040

LARRY J LEMASTER
2158 BENTON ST
GRANITE CITY, IL 62040

JERRY BADGETT
1716 CHESTNUT ST
GRANITE CITY, IL 62040

EDWIN A MEYERS
1751 CHESTNUT ST
GRANITE CITY, IL 62040

YVONNE PASSIG
1753 CHESTNUT ST
GRANITE CITY, IL 62040

RESIDENT
1726 CLEVELAND BLVD
GRANITE CITY, IL 62040

ANN PEEPER
1929 CLEVELAND BLVD
GRANITE CITY, IL 62040

RESIDENT
1939 CLEVELAND BLVD
GRANITE CITY, IL 62040

MARJ SHEPPARD
2036 CLEVELAND BLVD
GRANITE CITY, IL 62040

JOSEPH F SCHMIDT
2116 CLEVELAND BLVD
GRANITE CITY, IL 62040

JERALD RAGAN
2140 CLEVELAND BLVD
GRANITE CITY, IL 62040

SIDNEY C VAUGHN
2246 CLEVELAND BLVD
GRANITE CITY, IL 62040

ALICE ZIMMERMAN
1712 DELMAR AVE
GRANITE CITY, IL 62040

MYRA D GROTE
2233 DELMAR AVE
GRANITE CITY, IL 62040

RESIDENT
2265 DELMAR AVE
GRANITE CITY, IL 62040

BARBARA TURNBOUGH
1726 EDISON AVE
GRANITE CITY, IL 62040

MICHAEL D KELLY
2211 EDISON AVE
GRANITE CITY, IL 62040

JOSEPH MOKRI
1436 GRAND
GRANITE CITY, IL 62040

THERON L. HAGUE
1734 GRAND
GRANITE CITY, IL 62040

VICTORIA MERTZ
2217 GRAND AVE
GRANITE CITY, IL 62040

ARTHUR W SUHRE
2246 GRAND AVE
GRANITE CITY, IL 62040

JOHN WAYNICK
2161 LEE AVE
GRANITE CITY, IL 62040

NANETTE BOYER
2025 MADISON AVE
GRANITE CITY, IL 62040

TABLE 4-2
RESIDENTIAL LOTS TO BE RESAMPLED

JOSEPH S PETRA
1730 MAPLE ST
GRANITE CITY, IL 62040

HARRY W CHRONISTER
1625 OLIVE ST
GRANITE CITY, IL 62040

FLOYD BAXTER
1626 SPRUCE ST
GRANITE CITY, IL 62040

RESIDENT
1705 STATE ST
GRANITE CITY, IL 62040

CHLOE SIMPSON
2135 STATE ST
GRANITE CITY, IL 62040

DENISE TAYLOR
1751 WALNUT ST
GRANITE CITY, IL 62040

ELSIE TAYLOR
2038 WASHINGTON
GRANITE CITY, IL 62040

GRANITE CITY PUBLIC LIBRARY
2001 DELMAR
GRANITE CITY, IL 62040

MCKINLEY SCHOOL
2103 IOWA
GRANITE CITY, IL 62040

LESTER PATTERSON
1224 ALTON AVE
MADISON, IL 62060

RESIDENT
1916 ELIZABETH
MADISON, IL 62060

RESIDENT
1320 GRAND
MADISON, IL 62060

JOHN FREE
1604 KENNEDY DR
MADISON, IL 62060

RESIDENT
1112 REYNOLDS
MADISON, IL 62060

LOUVERN PRITCHARD
615 SALVETER
MADISON, IL 62060

SYLVIA OPICH
1920 12TH STREET
MADISON, IL 62060

ALBERT GRUPAS
1302 WASHINGTON AVE
MADISON, IL 62060

TABLE 4-3
BOUNDARY DEFINITION STUDY SAMPLING LIST

HELEN THOMAS
2326 EDISON AVE
GRANITE CITY, IL 62040

MIKE LOYES
2327 EDISON AVE
GRANITE CITY, IL 62040

EDWARD REIS
2432 EDISON AVE
GRANITE CITY, IL 62040

JOHN IRWIN
2433 EDISON AVE
GRANITE CITY, IL 62040

ELAINE GORRELL
2539 EDISON AVE
GRANITE CITY, IL 62040

LINDA HUGHES
2548 EDISON AVE
GRANITE CITY, IL 62040

ERIC CUNNINGHAM
2609 EDISON AVE
GRANITE CITY, IL 62040

RESIDENT
2620 EDISON AVE
GRANITE CITY, IL 62040

MIKE SEATON
1422 EIGHTH ST
MADISON, IL 62060

RESIDENT
1417 FIFTH ST
MADISON, IL 62060

FRANK GREENWALD
2727 GRAND AVE
GRANITE CITY, IL 62040

RESIDENT
2811 GRAND AVE
GRANITE CITY, IL 62040

VINCENT ENGLISH
2855 GRAND AVE
GRANITE CITY, IL 62040

MILDRED HAYES
2605 LOGAN ST
GRANITE CITY, IL 62040

LOUIS LEE
2621 LOGAN ST
GRANITE CITY, IL 62040

EDWARD LANE
2125 MISSOURI AVE
GRANITE CITY, IL 62040

TAMMY BRAZEL
2131 MISSOURI AVE
GRANITE CITY, IL 62040

LILLIAN RYAN
2219 MISSOURI AVE
GRANITE CITY, IL 62040

DAVID FOSTER
2229 MISSOURI AVE
GRANITE CITY, IL 62040

RESIDENT
2316 MISSOURI AVE
GRANITE CITY, IL 62040

BOB BRIMM
2417 MISSOURI AVE
GRANITE CITY, IL 62040

CHRIS HOFFMAN
2435 MISSOURI AVE
GRANITE CITY, IL 62040

HELEN STOWER
2720 STATE AVE
GRANITE CITY, IL 62040

DONALD WEIS
2912 STATE AVE
GRANITE CITY, IL 62040

JOHN KWIATHKOWSKI
2914 STATE AVE
GRANITE CITY, IL 62040

DONNA PALMER
1415 SEVENTH ST
MADISON, IL 62060

TABLE 4-3
BOUNDARY DEFINITION STUDY SAMPLING LIST

PHYLLIS CALDWELL
1430 SEVENTH ST
MADISON, IL 62060

RESIDENT
1436 SEVENTH ST
MADISON, IL 62060

TABLE 4-4

SAMPLE BREAK DOWN FOR LOTS TO BE RESAMPLED

SAMPLE ID	BORING 1			BORING 2		
	Depth 0"-3"	Depth 3"-6"	Depth 6"-12"	Depth 0"-3"	Depth 3"-6"	Depth 6"-12"
<u>GRANITE CITY</u>						
2028 BENTON	1	1	1	1	1	1
2153 BENTON	1	1	1	1	1	1
2158 BENTON	1	1	1	1	1	1
1716 CHESTNUT	1	1	1	1	1	1
1751 CHESTNUT	0	0	0	0	0	0
1753 CHESTNUT	1	1	1	1	1	1
1726 CLEVELAND	1	1	1	1	1	1
1929 CLEVELAND	1	1	1	1	1	1
1939 CLEVELAND	1	1	1	1	1	1
2036 CLEVELAND	1	1	1	1	1	1
2116 CLEVELAND	1	1	1	1	1	1
2140 CLEVELAND	0	0	0	1	1	1
2246 CLEVELAND	1	1	1	1	1	1
1712 DELMAR	0	0	1	0	0	1
2001 DELMAR	0	1	0	0	1	0
2233 & 2235 DELMAR	0	0	1	0	0	1
2265 DELMAR	1	1	1	1	1	1
1726 EDISON	1	1	1	1	1	1
2211 EDISON	1	1	1	0	0	0
1436 GRAND	1	1	1	1	1	1
1734 GRAND	1	1	1	1	1	1
2217 GRAND	0	1	0	0	1	0
2246 GRAND	0	1	0	0	1	0
2103 IOWA	1	0	0	1	0	0
2161 LEE	0	1	0	0	1	0
2025 MADISON	1	1	1	1	1	1
1730 MAPLE	1	1	1	1	1	1
1625 OLIVE	1	1	1	1	1	1
1626 SPRUCE	1	0	0	0	0	0
1705 STATE	1	1	1	1	1	1
2135 STATE	0	1	0	0	0	0
1751 WALNUT	1	1	1	1	1	1
2038 WASHINGTON	1	1	1	1	1	1

TABLE 4-4

SAMPLE BREAK DOWN FOR LOTS TO BE RESAMPLED

SAMPLE ID	BORING 1			BORING 2		
	Depth 0"-3"	Depth 3"-6"	Depth 6"-12"	Depth 0"-3"	Depth 3"-6"	Depth 6"-12"
<u>MADISON</u>						
1224 ALTON	1	1	1	1	1	1
1916 ELIZABETH	1	1	1	1	1	1
1320 GRAND	1	1	1	1	1	1
1604 KENNEDY	1	1	1	1	1	1
1112 REYNOLDS	1	1	1	1	1	1
1914 12TH	1	1	1	1	1	1
615 SALVETER	1	1	1	1	1	1
1302 WASHINGTON	0	0	0	1	1	1
TOTAL NUMBER OF SAMPLES BY DEPTH	31	34	31	31	34	33
TOTAL NUMBER OF SAMPLES						194

TABLE 6-1

**SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES
NL/TARACORP SUPERFUND SITE**

Method	Parameter	Type of sample	Number of Containers per Sample	Minimum Sample Size	Number of Samples	Number of QA/QC Samples	Preservation	Holding Time
3050 / 6010	Total Lead	Soil	One 4oz wide mouth poly jar with Teflon lined lid	10 g	1356	120 / 221	4 deg C	6 months
1311 / 3010 / 6010	TCLP Lead	Soil	One 4oz wide mouth poly jar with Teflon lined lid	100 g	160	*	4 deg C	6 months
3020 / 7421	Lead	Water (Rinsate)	1 L Poly	1 L	0	1 / 13	Nitric Acid to pH < 2 & 4 deg C	6 months

- * TCLP-lead samples will be selected from Total Lead samples with levels > 500 ppm. QC samples will be selected at that time and will include a 5% frequency for duplicate samples, and matrix spike for each sample.

TABLE 7-1
ANALYTICAL PROCEDURES AND REPORTING LIMITS
NL/TARACORP SUPERFUND SITE

PARAMETER	TECHNIQUE (1)		EXTRACTION AND ANALYSIS METHOD (2)		REPORTING LIMITS	
	Water (3)	Soil	Water	Soil	Water	Soil
Lead	ICP	ICP	3020/6010	3050/6010	0.1 mg/l	5 mg/kg
TCLP - Lead	NA	Extraction	NA	1311/3010/6010	NA	0.005 mg/l

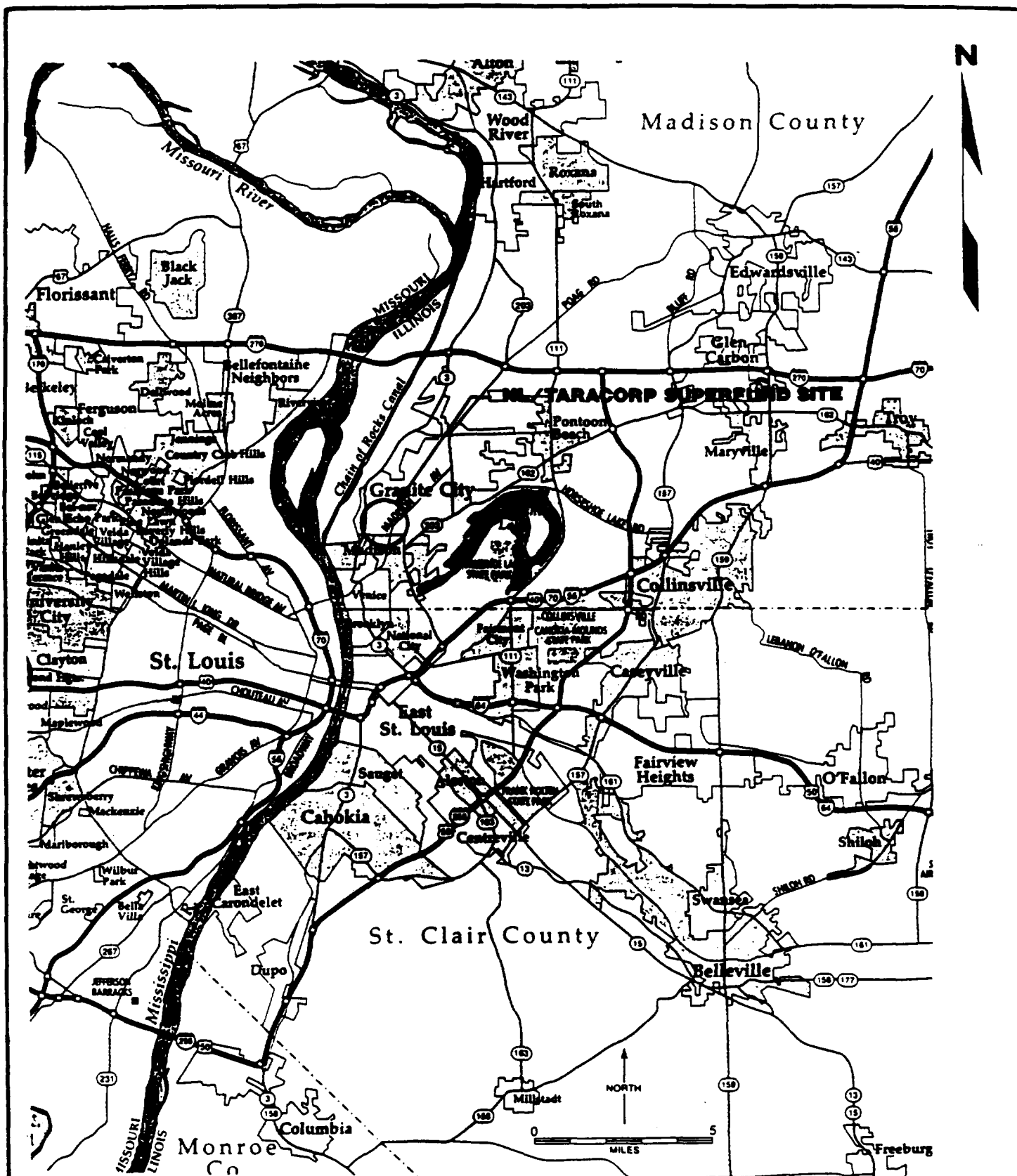
(1) ICP - Inductively Coupled Plasma

(2) Method numbers from Third Edition, USEPA SW-846

(3) Lead analysis to be conducted on rinsate samples only.

NA - not applicable

FIGURES



NL/TARACORP SUPERFUND SITE
U.S. ARMY CORPS OF ENGINEERS
GRANITE CITY, ILLINOIS

PROJECT NO.
89MC114V

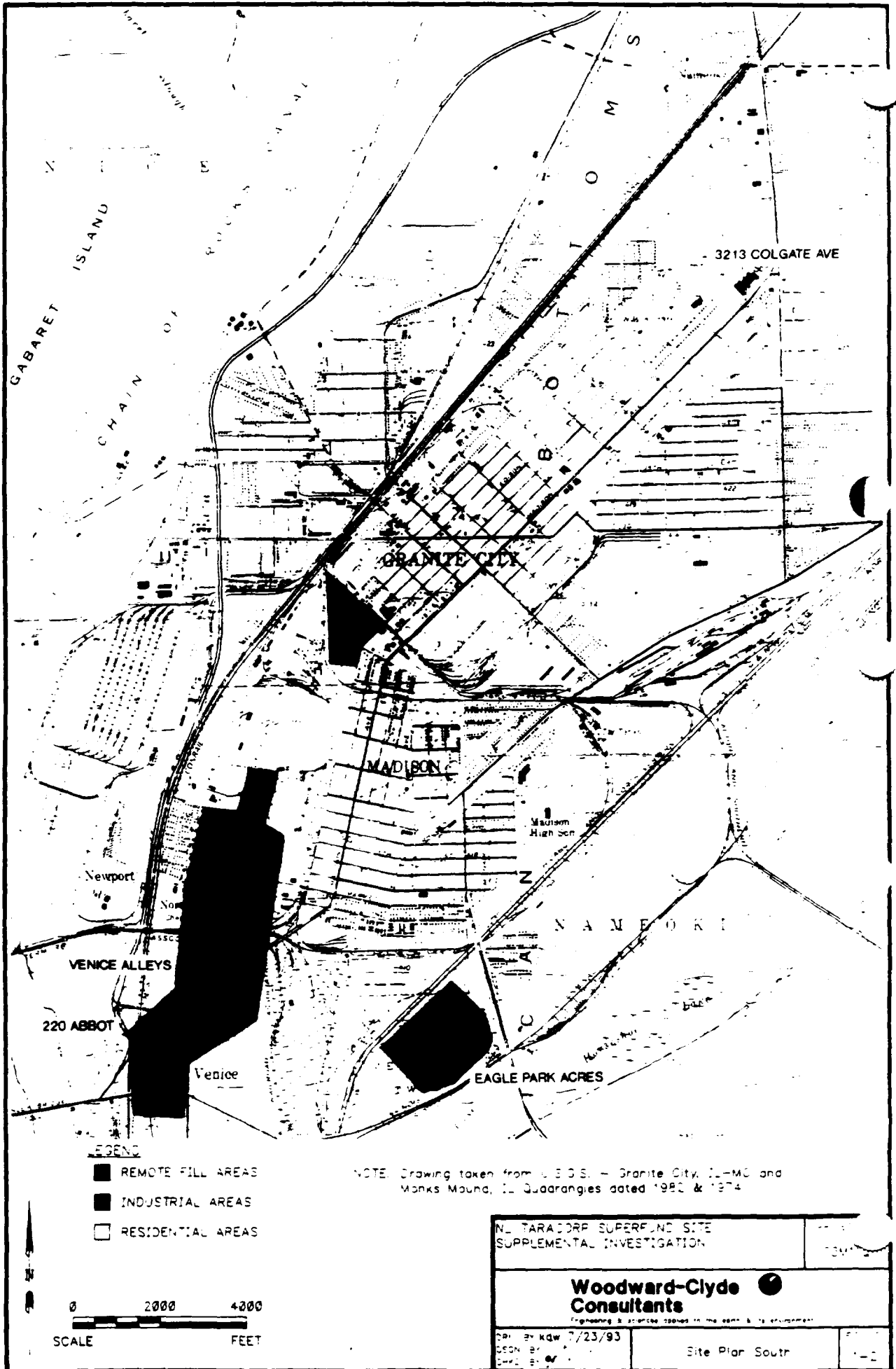
Woodward-Clyde Consultants

CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS

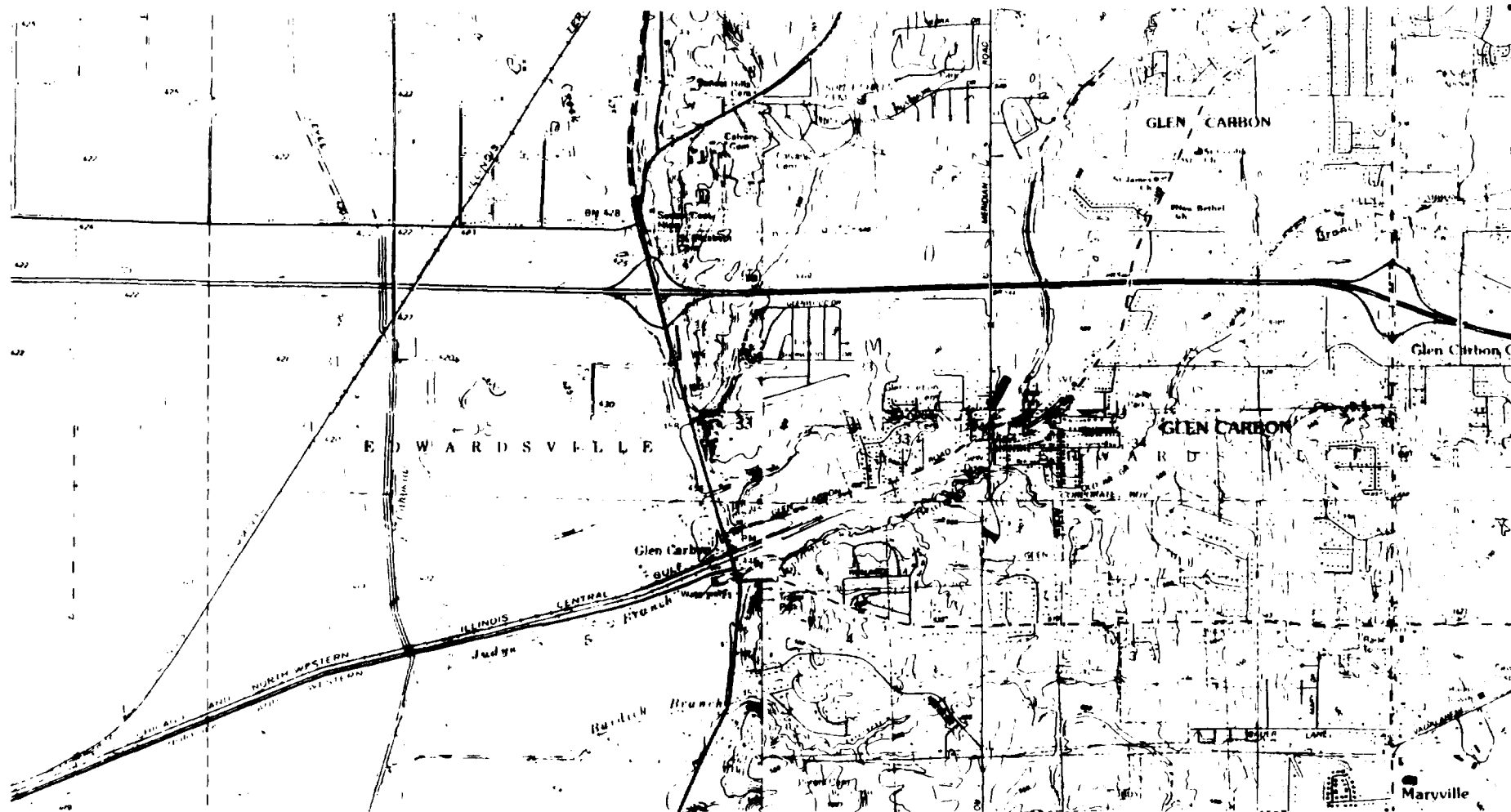
DRN. BY: kmm 7/16/91
CHKD. BY:

Site Location Map

FIG NO
1-1



File name: D:\CJM\110\FIG1-3.DWG Last edited: 31.08.94 09.47



LEGEND

■ REMOTE FILL AREA

NOTE: Drawing taken from U.S.G.S - Collinsville, IL dated 1991, Monks Mound, IL dated 1954, Wood River, IL - MO dated 1955 and Edwardsville, IL dated 1991

2000 0 2000
SCALE FEET

NL/TARACORP SUPERFUND SITE
SUPPLEMENTAL INVESTIGATION

PROJECT NO

C3M11Q

Woodward-Clyde
Consultants

Engineering & sciences applied to the earth & its environment

DRN BY: lm 8/4/93

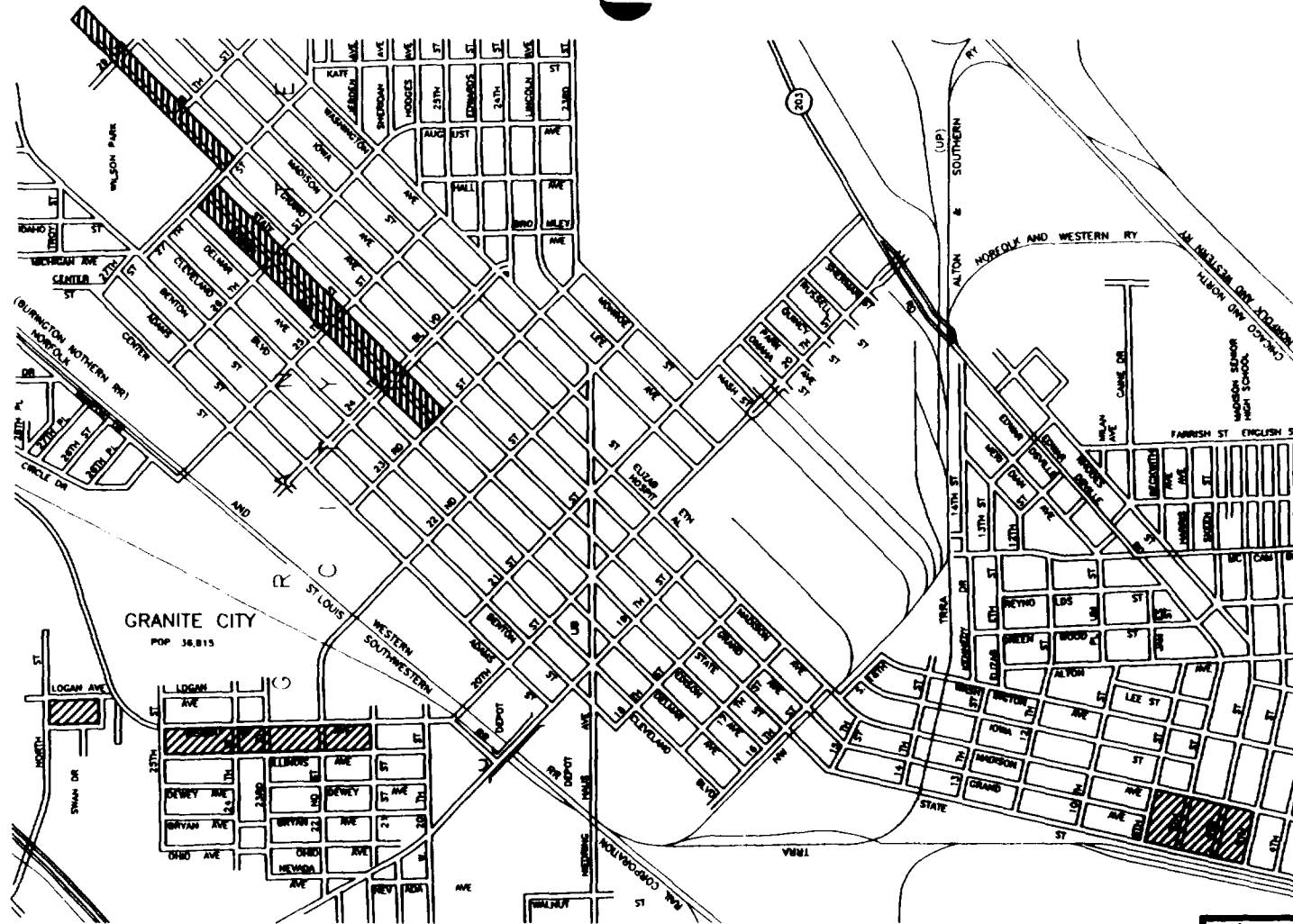
DESIGN BY: JLT

CHKD BY:


Site Plan North

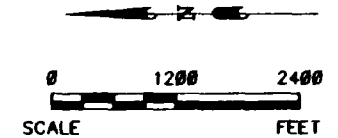
FIG NO

1-3

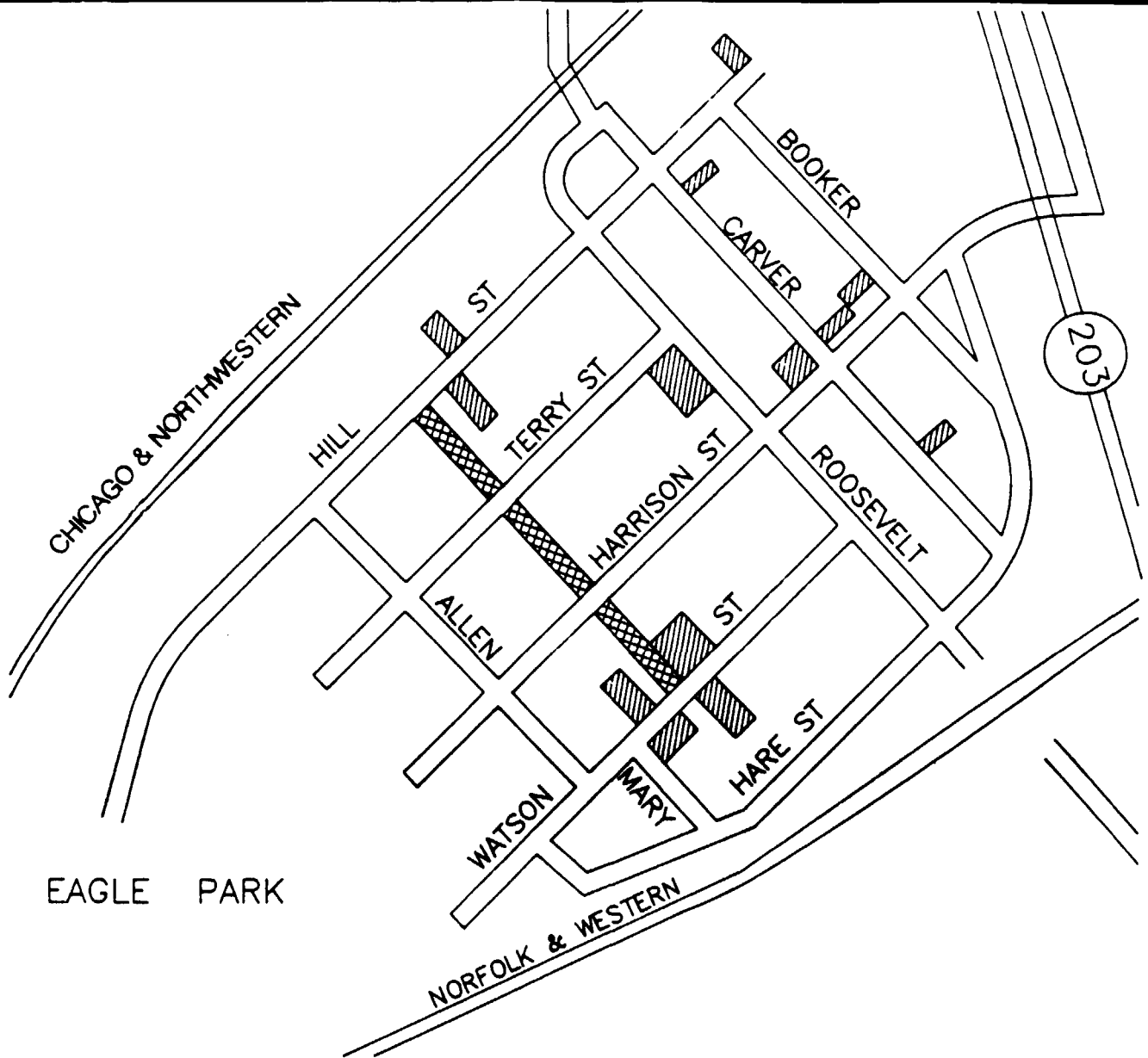


LEGEND

 RESIDENTIAL AREAS WHERE BOUNDARY DEFINITION SAMPLING WILL BE CONDUCTED



NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION		PROJECT NO C3M11Q
Woodward-Clyde Consultants <small>Engineering & sciences applied to the earth & its environment</small>		
DRN BY kdw 7/15/93 DSGN BY JEP 8/7/92 CHKD BY JEP 8/7/92	Boundary Definition Sampling Areas	FIG NO 1-4



EAGLE PARK

LEGEND



PROPERTY TO BE SAMPLED



ALLEY TO BE SAMPLED

NL/TARACORP SUPERFUND SITE
SUPPLEMENTAL INVESTIGATION

PROJECT NO.

C3M11Q

Woodward-Clyde
Consultants

Engineering & sciences applied to the earth & its environment

DRN. BY: kdw 7/16/93
DSGN. BY: JCF 7-15-93
CHKD. BY: CFP 8/27/93

Eagle Park Acres
Sampling Locations

FIG. NO.

4-1



PROJECT ORGANIZATION CHART

Figure 3-1

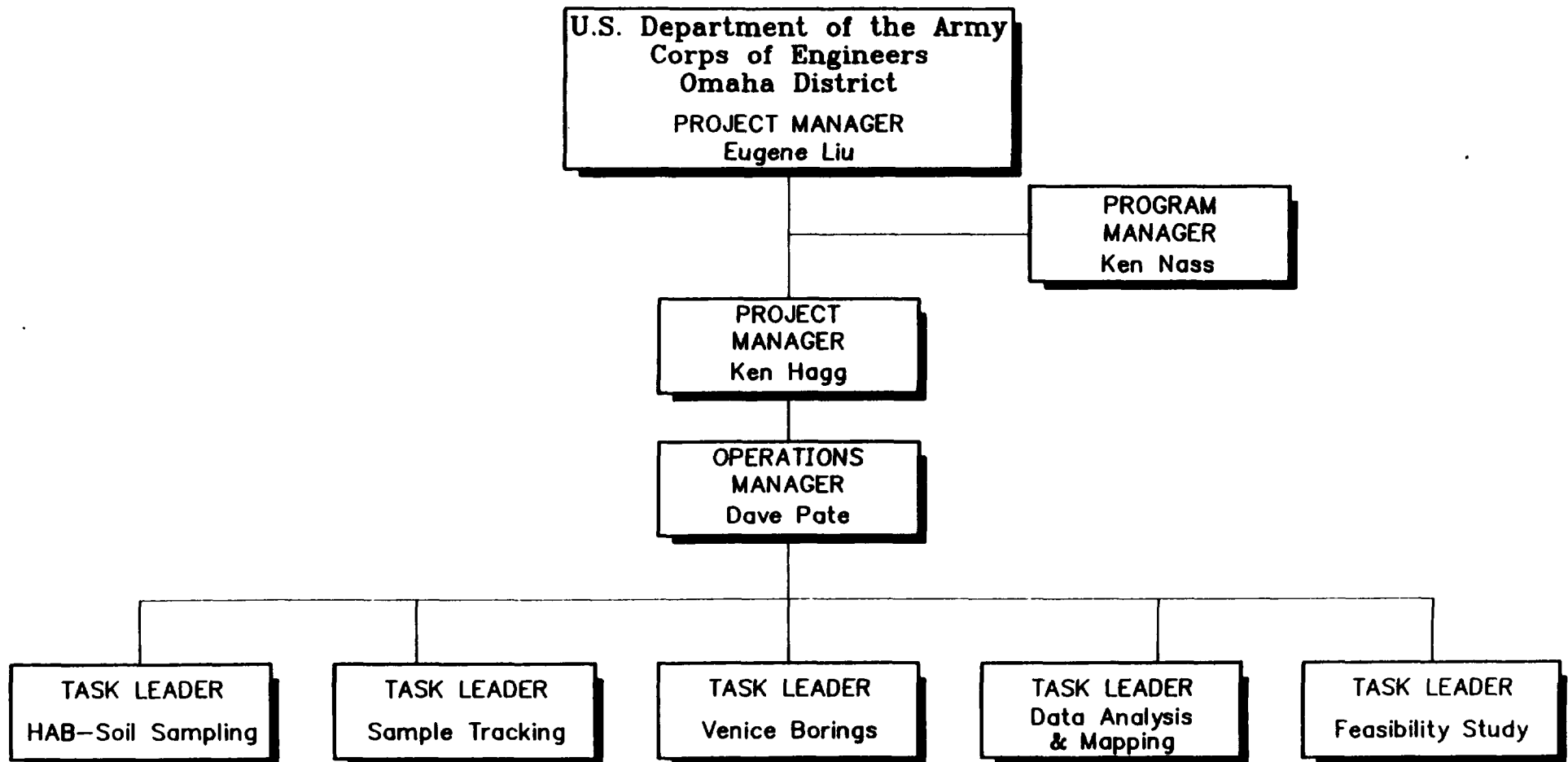
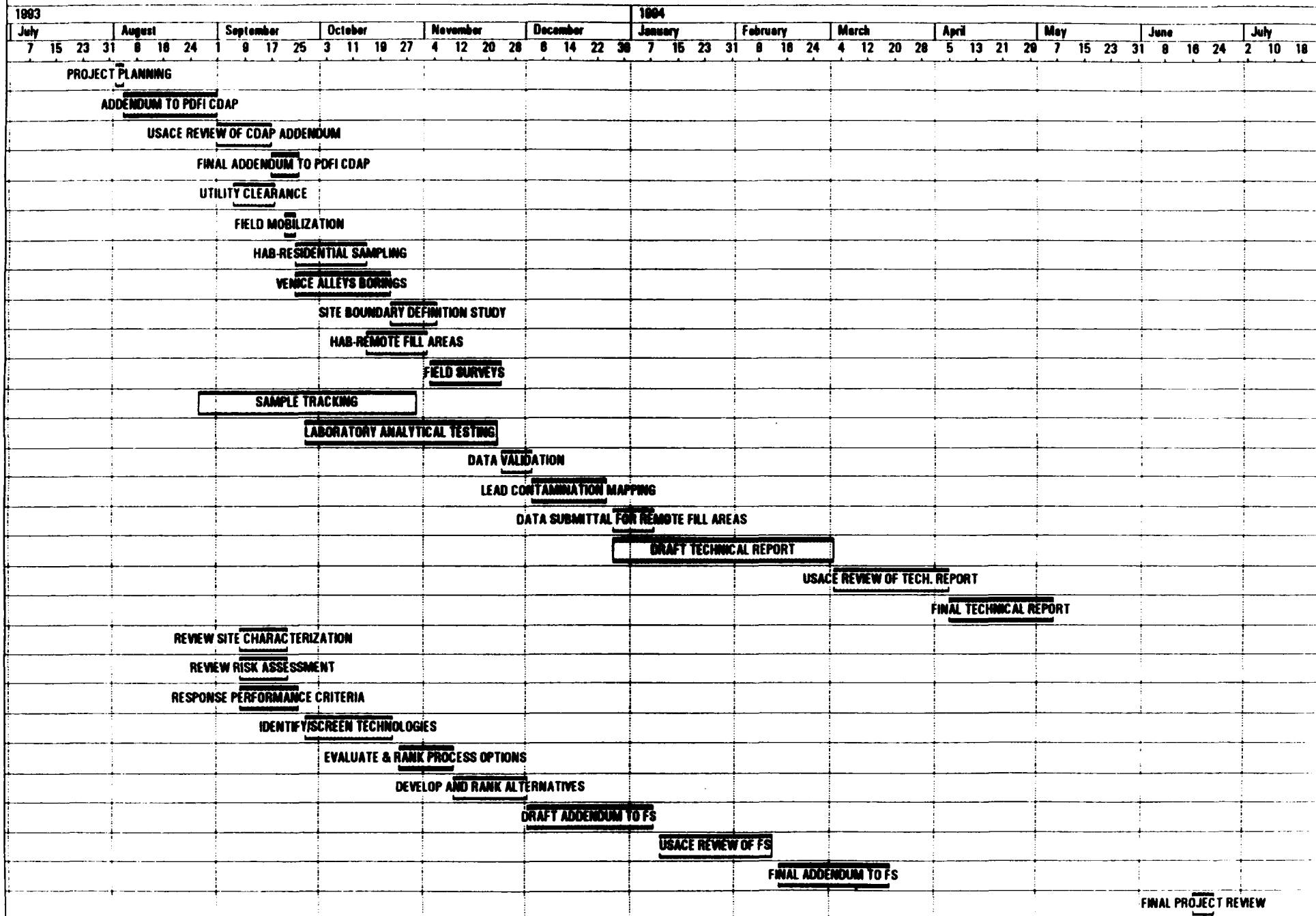
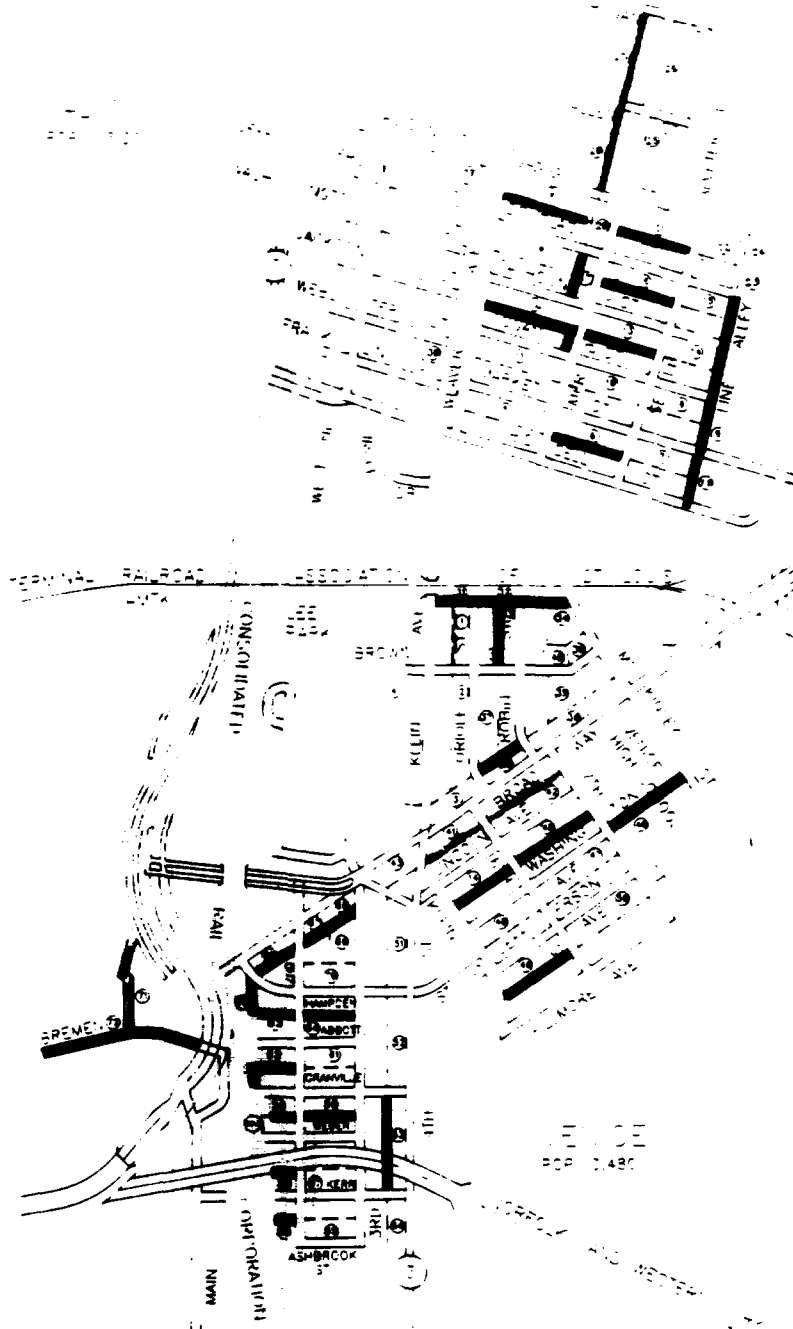


FIGURE 1-5: NL/TARACORP SUPERFUND SITE SUPPLEMENTAL INVESTIGATION PROJECT SCHEDULE





LEGEND

- SAMPLED DURING PDI
- ALLEY TO BE SAMPLED
- CAT. I - TO BE SAMPLED BY OHM
- ▤ CAT. II - TO BE SAMPLED BY WC
- ▥ CAT. III - TO BE SAMPLED BY WC
- CAT. IV - NO ACTION

0 800 1600
SCALE FEET

NL TARACORP SUPERFUND SITE
SUPPLEMENTAL INVESTIGATION

PROJECT NO.
03M1

Woodward-Clyde
Consultants

Engineering & sciences applied to the earth & its environment

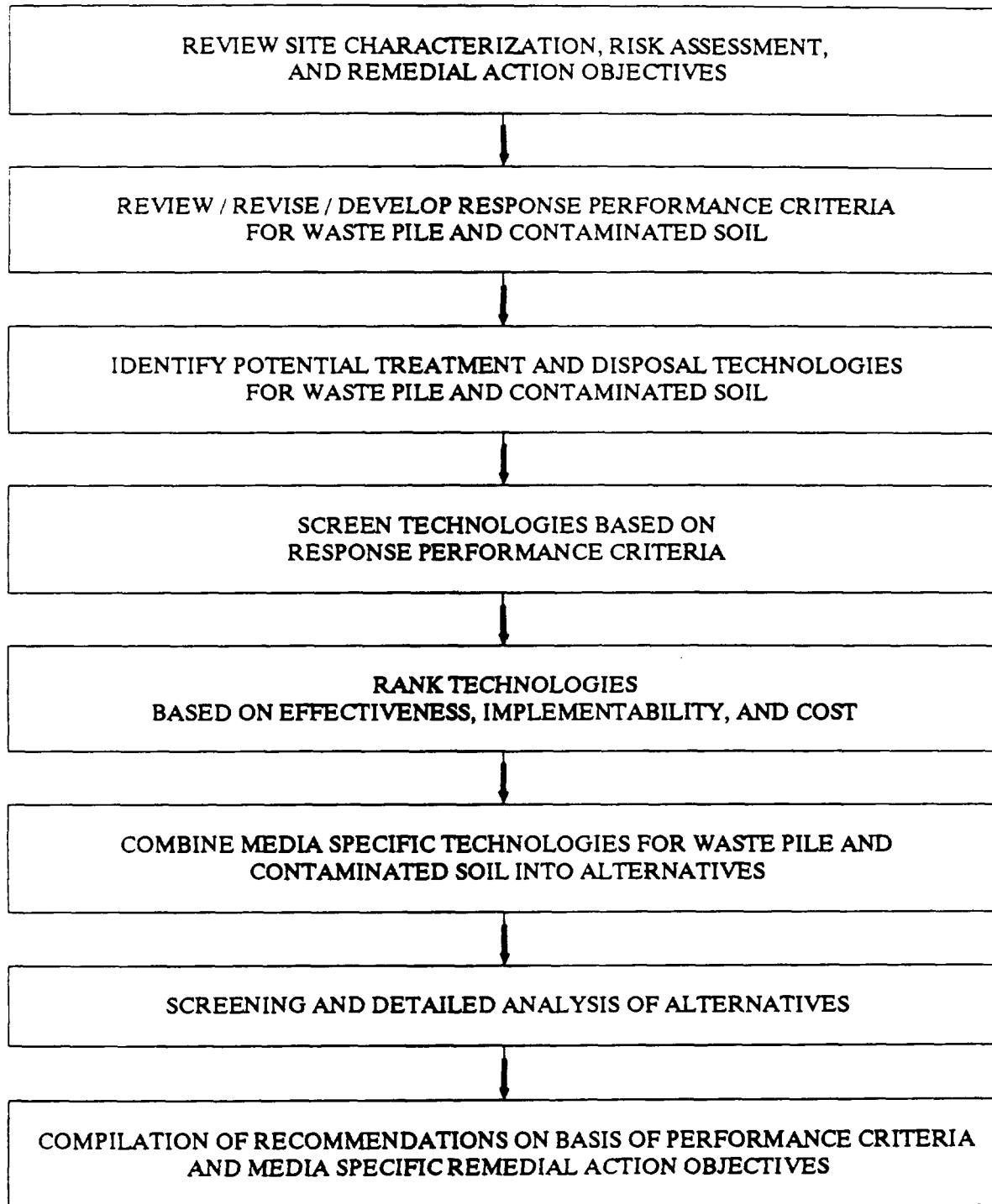
DPN BY kdw 7/23/93
CSDN BY
CHKD BY

Venice Alley Location Map

FIG. NO.
4-2

FIGURE 5-1

FLOWCHART FOR ADDENDUM TO THE FEASIBILITY STUDY
NL / TARACORP SUPERFUND SITE



APPENDIX A

**QUALITY ASSURANCE / QUALITY CONTROL MANUAL
ENVIRONMETRICS, INC.
LABORATORY**

Appendix A

III

Section 1

QUALITY ASSURANCE OBJECTIVES

Introduction

The overall Quality Assurance Objective at Environmetrics is to develop and implement procedures for chain-of-custody, laboratory analysis, and reporting that will provide legally defensible results and insure the generation of reliable and valid analytical data. Specific procedures to be used for chain-of-custody, calibration, laboratory analysis, reporting, internal quality control, audits, preventative maintenance, and corrective actions are described in other sections of this document. The purpose of this section is to define QA goals for accuracy, precision, and completeness. Establishment of these goals allows the clients of Environmetrics to judge the adequacy of the results being obtained. These items are addressed in the EPA Manual on Analytical Quality Control in Water and Wastewater Laboratories (EPA-600/4-79-019, March 1979). This manual and Section 1 of the SW-846 will always be followed in analysis of water and soil/sediment for organic and inorganic parameters.

The overall goals and objectives of the Environmetrics laboratories are to provide sufficient information to allow the technicians, chemists, section managers, and the laboratory director to initiate or reinforce programs of analytical QC that emphasize early recognition and correction of factors leading to breakthrough in the validity of data. Therefore, the purpose of this Quality Assurance Manual is to insure that the objectives related to sample analysis are met.

Quality Assurance

Quality Assurance (QA) is defined as procedures that are necessary in order to produce reliable results in sampling and analysis. In general, this refers to uniform field techniques, good laboratory practices and good standard operating procedures that are used to maintain consistency and uniformity of the above. If a deviation from analysis, sampling, etc. is necessary, good documentation is needed to assure that there is a valid reason for the deviation from protocol or standard operating procedure. This is also needed to maintain integrity of the data.

Quality Control

Quality Control (QC) is defined as the set of operational techniques and activities that are used for obtaining prescribed standards of performance in the monitoring and measurement process.

Accuracy

Accuracy is the closeness of agreement between an observed value and an acceptable reference value. The QA accuracy objectives for quantitative analysis is expressed in terms of recovery of surrogate compounds or spiked analytes. The equations used to calculate percent recoveries of surrogate compounds and spiked analytes added to a sample are given in Section 10.

The QA accuracy objective for quantitative analysis is generally 80% for the lower limit and 120% for the upper limit. Environmetrics realizes that there are some compounds for which this recovery is not possible. In all cases, the laboratory will strive to achieve the stated goal for accuracy.

The specific compounds used for spiking must be verified by the use of EPA acceptable reference standards. These accuracy objectives shall apply to results obtained for reference standards, spiked samples, and performance evaluation samples.

Precision

The objective for precision where duplicates or replicate analyses have been performed are as follows:

- Analysis of Duplicate or Replicate Samples

One of the QA objectives is that the results of quantitative analysis for duplicate or replicate samples be within the limits specified in methods and protocols described in SW-846 and 40CFR, part 136.

- Analysis of Surrogates or Analyte Spikes

One of the QA objectives is that the standard analysis of surrogate compounds or analyte spikes in Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples and duplicate samples from a given site be within the limits specified in methods or generated by Environmetrics laboratory.

The equations used to calculate precision are given in Section 10.

Completeness

Environmetrics defines the degree of completeness as the percent of samples for which acceptable analytical data are generated. The equation used to calculate completeness is given in Section 10. The QA objective for most programs is 95%.

Representativeness

Representativeness expresses the degree to which sample data accurately represents the site, a specific matrix or parameter variations at a sampling point. Representativeness is a qualitative parameter which is dependent on both the proper design of the sampling program and proper laboratory protocol. The representative criterion is best satisfied by making certain that sampling locations, procedures, and quantity are selected based on the project objectives, and that proper analytical procedures are utilized, preservation requirements are met and holding times are not exceeded in the lab.

Comparability

Comparability expresses the confidence with which one data set can be compared with another. Sample data will be comparable with other measurement data if consistent documented analytical procedures are used for similar samples and sampling methods and conditions.

Section 2

Sampling Procedures Containers, Preservatives, Holding Times

Introduction

Before sampling of any site is performed, the client's Project Manager for the site should meet with Environmetrics' QA Officer, or his designee. The purpose of the meeting will be to establish the sampling methodology to be employed, and the tests that will be performed on the samples. A Sample Collection Planning Request Form will be completed. When possible, the QA Officer and field sampling team will establish the sensitivity required for the analytical tests. This will be possible in cases where the approximate levels of suspected regulated substances that are present in the samples are known.

After the planning meeting, the client will notify the laboratory and provide specifics of scope of the required services. Sample containers, preservatives and shipping containers, "blue ice", and chain of custody forms will be provided by Environmetrics. The QA Officer will ensure that, as part of the sampling plan, sufficient sample is available for analysis.

Environmetrics, Inc. laboratory will supply bottles, coolers, containers, and chain-of-custody forms to clients for collecting water, hazardous waste and soil/sediment samples. After samples have been taken, they should be sent to Environmetrics for analysis within 24 hours after collection. Typically, the holding time begins from the date of collection in the field. For some programs the holding time begins the day the samples are delivered to the laboratory.

Tables 2.1 and 2.2 present the holding times and type of containers and preservatives to be used. Typically, the requirements of 40CFR, part 136 will be followed. However, SW-846 (3rd edition) and CLP sampling procedures are also presented.

PREPARATION OF SAMPLE CONTAINERS

Environmetrics, Inc. supplies new and pre-cleaned sample containers. These containers are purchased from nationally known vendors, who in many cases supply containers to the USEPA and state agencies, and are cleaned in conjunction with the procedures set by the EPA for quality-controlled sample containers.

All pre-cleaned containers are supplied as either Level I or Level II certified. All Level I and Level II containers are cleaned in accordance with the attached cleaning procedures. Level I containers are supplied with Certificates of Analysis outlined as follows:

<u>Cleaning Procedure</u>	<u>Type of Container</u>	<u>Analysis</u>
"A"	All clear glass All amber glass	Metals Pesticides Semivolatiles
"B"	Vials with septa Bottles with septa	Volatiles
"C"	HDPE plastic bottles	Metals Cyanide Fluoride
"D"	Cubitainers	Conductivity

The Certificate of Analysis includes the bottle type and QA Level, description, lot number, date analyzed, and the names of the compounds analyzed with their detection limits. A certification for Level II containers is also supplied. This Level II certification verifies that the containers are washed in conjunction with the procedures set by the EPA for quality-controlled sample containers.

The selection, storage, distribution, and control of sample containers is under the supervision of the director of operations and the shipping/receiving supervisor. Depending on the container requirements of a project, Level I or Level II containers can be provided. Level I containers should only be used for critical/trace analyses.

The cleaning procedures are established as follows:

Cleaning Procedure A: (all clear and amber glass containers)

1. Wash bottles, liners, and caps in laboratory grade non-phosphate detergent.
2. Rinse three times.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with ASTM Type 1 organic-free water.
5. Oven dry for one hour.
6. Rinse with hexane.
7. Oven dry for one hour.

Analyzed for metals, pesticides, and semivolatiles.

Cleaning Procedure B: (all vials and bottles with septa lid)

1. Wash bottles, liners, and caps in laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse three times with ASTM Type 1 water.
4. Oven dry for one hour.

Analyzed for volatiles.

Cleaning Procedure C: (HDPE plastic bottles)

1. Wash bottles, liners, and caps in laboratory grade non-phosphate detergent.
2. Rinse three times.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with ASTM Type 1 organic-free water.
5. Air dry.

Analyzed for metals, cyanide, and fluoride.

Cleaning Procedure D: (Cubitainers)

1. Rinse three times with deionized water.
2. Let stand forty-eight hours with DI water.
3. Air dry.

Table 2.1 Preservatives and Holding Times for
SW-846, 3rd ed.

Parameter	Container	Preservative	<u>Holding time</u>	
			Soil	Water
Volatiles by GC/MS and GC	Water-40 ml glass vial w/ Teflon-lined septa	Cool, 4°C pH<2 with HCl	14 days	14 days
	Soil-Glass with Teflon-lined septa	Cool, 4°C		
Pesticides/ PCB	G, Teflon-lined lid	Cool, 4°C	Extract within 14 days analyze 40 days	Extract within 7 days analyze 40 days
Extractable Organics	G, Teflon-lined lid	Cool, 4°C	Extract within 14 days analyze 40 days	Extract within 7 days, analyze 40 days
Metals	P, G	HNO ₃ to pH<2	6 mos.	6 mos.
Mercury	P, G	HNO ₃ to pH<2	28 days	28 days
Cyanide	P, G	NaOH to pH>12 Cool 4°C add 0.6g ascorbic acid if residual chlorine present	14 days	14 days
Chromium VI	P, G	HNO ₃ to pH<2	24 hrs.	24 hrs.

P = Plastic
G = Glass

Section 3

SAMPLE CUSTODY PROCEDURES

Introduction

The procedures and definitions described below are necessary to maintain data validity and control. This includes the sample numbering system, custody of samples in the field, transportation to the laboratory via a certified carrier, and at the laboratory and all associated transfers of custody.

Definition

A sample is in someone's custody if:

- a. It is in his/her actual possession, or
- b. It is in his/her view, after being in his/her physical possession, or
- c. It is in his/her physical possession and locked up so that no one can tamper with it, or
- d. It is kept in a secured area restricted to authorized personnel only.

Field Sampling Operations

The field sampler will keep a bound field notebook, in which is recorded conditions and activities related to each sample collection. The sample will be placed in the correct container appropriately marked with a sample label. If the sample remains in the custody of the sampler, as described above, no sample seals will be required.

Transfer of Custody

Samples collected by client's personnel will remain in the custody of the designated field custodian until delivery to the laboratory sample custodian or the certified carrier. The form shown in Figure 3.1 is a chain of custody form that must be completed by the sample carrier and the laboratory custodian.

Laboratory Custody Procedures

The following procedures will be followed by the laboratory:

All samples shall be handled by a minimum number of people.

The laboratory shall set aside "secured sample storage areas". These areas will be clean, dry, refrigerated, isolated, and securely locked. Volatile organic samples will be stored separately.

A specific person shall be designated custodian and an alternate designated to act in the custodian's absence. All incoming samples shall be received by the custodian, (or his/her designee) who shall indicate receipt by signing the accompanying chain of custody sheets.

The sample custodian shall maintain a computer log to record, for each sample, the person delivering the sample, the person receiving the sample, the date and time received, the source of sample, the sample identification or log number, how the sample was transported to the laboratory and the condition in which the sample was received (sealed, unsealed, broken container, or other pertinent remarks). A standardized format will be established for log book entries.

The custodian shall ensure that samples with heat-sensitive, light-sensitive and/or other unusual physical characteristics, or requiring special handling, are properly stored and maintained prior to analysis.

The laboratory area will be maintained as a secured area, restricted to authorized personnel only.

Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them, and should be prepared to testify that the sample was in their possession and view, or secured in the laboratory at all times, from the moment it was received from the custodian until the time the analyses are completed. The laboratory personnel will return samples to the secure storage area after aliquating the samples so that holding times for other parameters will not be invalidated by leaving samples at room temperature too long.

The samples and their associated extracts will be held for thirty days after the final report has been delivered to the client. The time and date of discard will be recorded in the log. Data sheets will be kept secured by the lab custodian.

ENVIRONMETRICS

2345 Millpark Drive
Maryland Heights, MO 63043
(314) 427-0550

CUSTOMER TRANSFER RECORD/LABOR DRY WORK REQUEST

COMPANY _____ CONTACT _____ PROJECT NO. _____
ADDRESS _____ DATE _____ P.O. NO. _____
CITY/STATE/ZIP _____ DUE DATE _____
PHONE () _____ FAX () _____

Page ____ of ____

SPECIAL INSTRUCTIONS: _____

SAMPLE IDENTIFICATION						ANALYSES REQUESTED												COMMENTS
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER													
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER

Section 4

CALIBRATION PROCEDURES AND FREQUENCY

Introduction

Calibration procedures and frequency of calibration are specified in Table 4.1 for all analytical tests that are performed most frequently. Environmetrics chemists and technicians follow the latest EPA and RCRA protocols and generate hard copy reports to show that these criteria have been met prior to and during sample analysis.

Metals Analysis/ICP

The following criteria will be used for assessing calibration data. Samples will not be analyzed unless these criteria are met.

Initial calibration curves must show a correlation coefficient between 0.995 and 1.000 when method of standard addition (MSA) is used.

Initial calibration verification and continuing calibration must show 90-110% recovery of all compounds except Mercury (80-120% required).

Organic Analyses

Methods 8240, 8260, 8270

The following criteria will be used in assessing calibration data for GC/MS Methods 8240, 8260, and 8270. Samples will not be analyzed unless these criteria are met:

Initial calibration response factors must have a % RSD less than 30% for EPA Calibration Check Compounds (CCCs). Average response factors for System Performance Check Compounds (SPCCs) must be greater than or equal to 0.30 (except for Bromoform) for VOAs and must be greater than 0.05 for SVOAs. All average response factors must be greater than zero.

QC check standards and continuing calibration must give response factors for CCCs that have a percent difference of no more than 25% from initial calibration. Average response factors for System Performance Check Compounds (SPCCs) must be greater than or equal to 0.30 (except for Bromoform) for VOAs, greater than 0.05 for SVOAs, All average response factors must be greater than zero.

Other Organic Methods

All organics analysis methods other than those listed above will follow procedures dictated in the individual methods for all calibrations, surrogates and internal standards, QC check samples, matrix spike samples, etc.

Table 4-1

CALIBRATION PROCEDURES AND FREQUENCY

<u>Parameter</u>	<u>Initial Calibration</u>	<u>Continuing Calibration</u>	<u>Comments</u>
Metals	3 point and blank with every analysis lot of furnace and flame. ICP calibrated according to instrument manufacturer's specifications.	One midpoint standard and blank at beginning of every 10 samples.	Method of Additions (MSA) for matrices with interferences
VOA	5 point (checked with every sample set).	One midpoint standard and blank, daily or every 12 hours.	QC check standard when new stock standards are used. Internal standard response checked daily
SEMI-VOA	5 point (checked with every sample set).	One midpoint standard and blank, daily or every 12 hours.	QC check standard when new stock standards are used. Internal standard response checked daily.

Table 4-1 (cont.)

CALIBRATION PROCEDURES AND FREQUENCY

<u>Parameter</u>	<u>Initial Calibration</u>	<u>Continuing Calibration</u>	<u>Comments</u>
Polynuclear Aromatics/ PNA	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standards are used.
Pesticides/PCB	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standards are used.
PCB(Oil, Wipe)	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standards are used.
VOA by G.C.	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standards are used.
TPH	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standard are used.

Table 4-1 (cont.)

CALIBRATION PROCEDURES AND FREQUENCY

<u>Parameter</u>	<u>Initial Calibration</u>	<u>Continuing Calibration</u>	<u>Comments</u>
Pesticides/PCB	3-5 point (checked with every sample set).	One midpoint standard and blank on daily basis.	QC check standard when new stock standards are used.
Fuels Fin-ferprint (GC/FID)	3 point (checked with every sample set). using appropriate petroleum product (e.g. gasoline, diesel jet fuel, etc).	One midpoint standard and blank, daily or every 12 hours.	External standards technique When possible, standards are to be site specific. QC check standard when new stock standards are used.

Section 5

ANALYTICAL PROCEDURES

Introduction

Selection and implementation of analytical procedures must be done such that chemists and technicians can produce accurate and reproducible data. All sources of bias and error must be minimized and well known to trained laboratory staff. The sampling process must be sound and related to the intended use of analytical procedures. Therefore, at Environmetrics, all aspects of the project are discussed with the client before analytical procedure are selected. In most cases, the procedures recommended in federal regulations (CWA, RCRA, CERCLA/SARA, TSCA, and SDWA) are followed. For non target compounds and unusual sample matrices, the laboratory staff will document all deviations from the accepted analytical procedures.

In general, the analytical procedures will take the following points under consideration:

- 1) Sample matrix
- 2) Preparation of samples
- 3) Detection limits
- 4) Choice of instrumentation/Analytical Methods
- 5) Preparation of Calibration standards
- 6) Holding times
- 7) Quality Assurance/Quality Control
- 8) Training of chemists/technicians
- 9) Data Handling/Validation
- 10) Instrument maintenance
- 11) Corrective action for out of control events
- 12) Safety

When a proposal becomes a task order, the client service group will discuss the specifics of the project with the lab personnel. A quality assurance project plan (QAPP) may be prepared for long term contracts. The analytical methods that will be used are in most cases from approved EPA, ASTM, or Standard Methods. Methods are translated into Standard Operating Procedures (SOP). SOP's are updated and maintained in each laboratory section.

Section 6

Data Reduction, Validation and Reporting

To produce data of high quality, the following steps are followed at Environmetrics:

- Data Recording and Data Maintenance
- Data Reduction
- Data Validation
- Data Review
- Data Reporting

Raw data produced by each section of the laboratory will be recorded in notebooks by the analyst. Computer printouts (GC/MS systems), chromatograms (GC and IC), gravimetric, and titration values will become a part of the project file so that every piece of data can be traced by the laboratory director, section managers, and the QA officer. The QA officer will issue the notebooks and log the date of issuance and the laboratory section to which the notebook was issued. Notebooks will be archived by the QA manager when they are filled or when the employee will no longer use the notebook.

Environmetrics analysts are responsible to reduce the raw data according to the requirements indicated in the protocols. Sample matrix, sample size, % moisture, final volume, amount injected, and other pertinent information will be used to calculate the concentration of the desired analytes. In most protocols software is written to reduce the data automatically. However, the analyst will review the data for correct identification and quantification.

Data validation is performed by checking the results of an analytical batch or case of samples. In reviewing a batch of samples, the QA officer, the laboratory director, and the section managers will be checking the following items:

- Sample numbers on the chain of custody vs the submitted data for the batch.
- Deviations from the agreed protocol and the reasons for the deviations.
- Calibration data, method blanks, proper sample and QC sample frequency.
- Method blank, surrogate, lab control sample, (LCS), matrix spike recoveries and detection limits.
- Precision and accuracy and their control limits.
- Corrective action report for any of the above items if there was an out of control event.

Section managers and chemists can disallow the use of the data and will discuss the reasons with the QA officer or lab manager.

After all data have been validated, the data management group will review the project/case file for completeness. The results will be entered into a summary report form. A full data package will be prepared if the client has requested copies of chromatograms, spectra, sample preparation forms, lab notebooks, etc. The final report will also be reviewed for data entry against the raw data in the file. A copy of the report and all the background information will be kept in the client's file.

Data Reporting Levels

Environmetrics, Inc. provides three levels of reporting. The QA-5 level is the standard level provided for routine analysis reports. The QA-4 and QA-5 reporting levels are provided on request prior to the initiation of the project.

QA-5 Reporting Level (Standard Reporting)

The deliverables for Reporting Level 5 includes the following standard information:

- 1) sample results
- 2) blank results
- 3) chain of custody
- 4) surrogate recovery results

Level 5 is the normal reporting level with fees included on the Environmetrics Fee Schedule.

QA-4 Reporting Level

The QA-4 Reporting Level requires the analysis of matrix spikes, and matrix spike duplicates. The deliverables include the following items:

- 1) QA-5 standard reporting
- 2) cover letter
- 3) laboratory control sample results
- 4) matrix spike and duplicate results

The matrix spikes and matrix spike duplicates will be charged as individual samples.

QA-3 Reporting Level

The QA-3 Reporting Level includes:

- 1) items listed in the QA-5 and QA-4 reporting levels
- 2) the results of the initial calibration
- 3) the continuing calibration and blanks
- 4) instrument printouts
- 5) log book pages
- 6) tentatively identified compounds

The fees for QA-3 reporting will be based on the scope of work.

Section 7

INTERNAL QUALITY CONTROL

Introduction

Internal Quality Control procedures include blanks, replicates, spiked samples, control charts, internal standards, QC samples, surrogate spikes, calibration standards, reagent checks, and reference samples.

For every procedure listed in the scope of work, mandatory QC procedures will be performed. Environmetrics will use the specified QC except where additional QC will enhance data quality. Such changes will be documented appropriately in the laboratory's Quality Control Plan. The frequency of use required for QC procedures described below will be discussed with each client depending on the use of data and the existing regulations. However, SW-846 will be followed for most analytical tasks.

Blanks

Blanks may consist of field trip blanks, field equipment blanks and/or laboratory blanks.

Based on the client's request, a field trip blank will be used when the samples to be obtained will be analyzed for volatile organic compounds. The field trip blank will consist of organic-free distilled water placed in the same type of bottle in which the samples will be placed, preservatives added if necessary, and carried by the sampling team in the same container as the field samples.

Clients may submit a field equipment blank that will be used to determine sample contamination due to field sampling equipment. These will be used to determine the adequacy of decontamination procedures in cases where samples come in contact with the sampling equipment.

Laboratory blanks are used to determine cleanliness, operation of equipment, etc. within the laboratory. The laboratory blank is carried through all cleanup and analytical operations as if it were a native sample. For organic analyses, surrogates and internal standards (if appropriate) are added to the blank also. The laboratory blank should be run prior to running the samples. In addition, a blank should be run at a minimum of one in twenty samples or one for each

analytical run, whichever is more frequent. If contamination is found that is not a routine laboratory solvent, the lab blank is not acceptable. The reason for the problem must be identified, corrected, and all subsequent standards, samples, etc. must be reanalyzed. Equipment should be clean enough so that the laboratory blank shows no contamination above the instrument detection limit. The laboratory is responsible for making sure that laboratory blanks are run at the required frequency.

Field Duplicate Samples

Field duplicate samples are used to establish the representativeness of the field sampling. Environmetrics uses field duplicates to establish a background on sample homogeneity. A field duplicate is obtained by taking two separate samples at the same location in a presumably homogeneous area. Results from analysis of duplicate field samples may be used to calculate precision, but will be used to interpret the homogeneity of samples.

Laboratory Replicate Samples

Laboratory replicate samples are normally obtained by taking a presumably homogeneous field sample, splitting the sample, and carrying both samples through the entire analytical procedure, including sample preparation. In some cases it is necessary to consume the entire sample during analysis (e.g., when the container walls must be washed). In this case, two samples must be obtained by the field sampling team. The analytical results from these samples are used for calculating the precision of the analyses.

Matrix Spike/Matrix Spike Duplicate

Laboratory matrix spike/matrix spike duplicates are obtained by taking a presumably homogeneous field sample, splitting the sample, spiking each split with predetermined quantities of stock solutions of certain analytes and carrying both samples through the entire analytical procedure, including sample preparation. A matrix spike/matrix spike duplicate must be analyzed with every run or every 20 samples when applicable. Percent recoveries are calculated for each of the analytes detected. The relative percent difference between the samples is calculated to assess the precision.

Method of Standard Additions

The method of Standard Additions (MSA) for metals analyzed by Furnace AA is required if recoveries of metals from the spiked sample is not between 85 and 115%. A standard addition is the addition of one or more required parameters to a sample immediately preceding the measurement procedure.

Surrogate Compounds

Environmetrics will use the following surrogate compounds.

- Volatile Organic (8240) Surrogate Compounds
 - a. 1,2-Dichloroethane-d₄
 - b. Toluene-d₈
 - c. 4-Bromofluorobenzene
- Semi-Volatile Organic (8270) Surrogate Compounds
 - a. 2-Fluorobiphenyl
 - b. 2-Fluorophenol
 - c. Nitrobenzene-d₅
 - d. Phenol-d₅
 - e. Terphenyl-d₁₄
 - f. 2,4,6-Tribromophenol
 - g. 2-Chlorophenol-d₄
 - h. 1,2-Dichlorobenzene-d₄
- Aromatic Volatile Organic (8020) Surrogate Compounds
 - a. Bromofluorobenzene
 - b. Fluorobenzene
 - c. 1,4-Difluorobenzene
 - d. 4-Bromochlorobenzene

Internal Standards

Internal standards will be used for quantitative analysis for all Volatile and Semi-Volatile Organics. The appropriate internal standards are specified in SW-846 and the Contract Laboratory Program protocols.

Section 8

PERFORMANCE AND SYSTEM AUDITS

Introduction

Performance and systems audits are required to assure that all required QA/QC are being performed and evaluation criteria followed.

Performance Audit

A performance audit is an independent check, by a person designated by laboratory management, or by an audit unit, to evaluate the data produced by a laboratory's analytical system, and is sometimes categorized as a quantitative appraisal of quality. There are several ways that this can be done:

- a. Worksheet review.
- b. Oral worksheet review.
- c. On-site analyst work review.
- d. Independent or check sample examination.
- e. Inter - and intralaboratory check sample, or proficiency test sample analysis review.

Performance audits will consist of evaluations of all data to ensure that all required QC checks are being made and evaluation criteria followed. The performance audits and data reviews will be conducted by the QA officer of the laboratory.

Systems Audit

A systems audit is an on-site inspection and review of a laboratory's QC system and is sometimes categorized as a qualitative appraisal of quality. It will cover any or all of the operational QC elements of the Quality Assurance program. Audits performed by Environmetrics QA officer may include instrumentation and backup, manpower, chain of custody, standard operating procedure, documentation sample storage, QA/QC procedures, preventative maintenance, proficiency testing, and personnel training.

Environmetrics has been participating in USEPA PE studies such as the WP and WS Series.

Section 9

Preventative Maintenance

Environmetrics has established a preventive maintenance program that is implemented by technicians and chemists in charge of analyzing samples by a specific instrument. Section managers of the organic and inorganic departments schedule and document all the activities performed. Table 9-1 shows the summary of Environmetrics equipment performance and maintenance schedules.

TABLE 9-1

EQUIPMENT PERFORMANCE AND MAINTENANCE SCHEDULE

A) Atomic Absorption Spectrophotometers

Each Use	As Needed	Quarterly or Annually
1. If burner is to be used, clean slot and install. After use, remove burner. Rinse spray chamber with distilled water.	1. Dust and clean. 2. Request repair of any malfunctioning part. 3. Replace D ₂ lamp. 4. Clean optics. 5. Replace fuels, oxidants, and drain tubing. 6. Clean nebulizer.	1. Disassemble nebulizer and clean. 2. Check gaskets and O-rings.
2. Check all instrument parameters.		
3. Align lamp for maximum light throughput at the analytical wavelength.		
4. Align burner for best sensitivity.		
5. Adjust gas flows and nebulizer for best sensitivity		
6. Run standards.		
7. Run QC samples.		

TABLE 9-1 (cont.)

EQUIPMENT PERFORMANCE AND MAINTENANCE SCHEDULEB) ICP

Each Use	As Needed	Annually
1. Check nebulizer aspiration hose.	1. Monthly ICP torch cleaning.	1. Manufacturer's Representative maintenance check.
2. Aspiration rate		
3. Check standard calibration.		

Environmetrics has been maintaining a service contract for ICP. This contract includes labor and parts for the ICP and data system.

C) Analytical Balances

Each Use	As Needed	Quarterly or Annually
1. Clean after each use.	1. Request repair if inaccurate or malfunctioning.	1. Check accuracy with weights. 2. Service engineer visit. (Contract with Fisher Scientific) 3. Annual calibrations of microbalances by service engineer.

D) Ovens

Each Use	As Needed	Quarterly or Annually
1. Check temperature	1. NA	1. Oil motor

E) Gas Chromatographs

Each Use	As Needed	Quarterly or Annually
1. Check cylinders.	1. Change gas evaluation checks.	1. Performance instrument parameters.
2. Run standards, blanks, samples, QC	2. Change filters, septa solvent and resin (Hall detector)	2. Check EC detector for radioactive leaks.

Environmetrics has been maintaining a service contract for all G.C. systems. This contract includes labor and parts for G.C.'s and data system.

F) High Pressure Liquid Chromatography Systems (HPLC)

Each Use	As Needed	Quarterly or Annually
1. Check reseviorers.	1. Change gas evaluation checks.	1. Performance instrument parameters.
2. Run standards, blanks, samples, QC	2. Change filters, septa solvent and resin (Hall detector)	

Environmetrics has been maintaining a service contract for all HPLC systems. This contract includes labor and parts for HPLCs and data system.

G) Purge and Trap Systems

Each Use	As Needed	Quarterly or Annually
1. Check instrument parameters.	1. Replace trap.	1. NA
2. Run standards, blanks, samples, QC.	2. Clean purge vessel.	

Environmetrics has been maintaining a service contract for all Purge & Trap systems which were purchase from Varian Instrument company.

H) Gas Chromatograph/Mass Spectrometer

Each Use	As Needed	Quarterly or Annually
1. Daily maintenance of GC tune instrument run DFTPP (tuning STD).	1. Change gas cylinders.	1. Performance Evaluation checks.
2. Run standards blanks, samples & GC.	2. Clean source (if tuning becomes difficult or curves are no longer linear.	

- | | |
|---|---------------------|
| 3. *Change septa
*Replace injection port liner.
*Replace GC seal
*Trim column
*Change ferrule | 3. Add oil in pump. |
|---|---------------------|

Environmetrics has been maintaining a service contract with Hewlett Packard Co. and Varian Instrument companies.

These contracts include labor and parts for GC/MS and the data system. However, the GC/MS operators are trained to clean the source and check the injection port liner, change septa and check columns for resolution/sensitivity/proper chromatography.

I) Refrigerator

Each Use	As Needed	Quarterly or Annually
1. NA	1. Temperature checked and logged daily.	1. NA

J) Deionized/Organic-Free Water

Each Use	As Needed	Quarterly or Annually
1. NA	1. Conductivity Checked daily. 2. Ion exchange bed changed. 3. Filters replaced.	1. NA

K) Vacuum Pumps & Air Compressors

Each Use	As Needed	Quarterly or Annually
1. NA	1. Check performance weekly. 2. Lubricate 3. Check belts, etc.	1. NA

L) Conductivity Meter

Each Use	As Needed	Quarterly or Annually
1. Calibrate with standard KCI	1. Clean electrodes.	1. NA

M) pH Meter

Each Use	As Needed	Quarterly or Annually
1. Calibrate meter.	1. Check electrode daily.	1. NA

Section 10

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

Assessment of Accuracy

Accuracy will be evaluated by comparing the mean recovery of surrogate compounds or spiked analytes against the goals identified in the client's scope of work. The recovery of a surrogate compound will be defined as:

$$\% \text{ Recovery} = \frac{\text{Grams of Surrogate Found in Sample}}{\text{Grams of Surrogate Added to Sample}} \times 100\%$$

The recovery of a spiked analyte will be defined as:

% Recovery =

$$\frac{\text{Total Analyte Found} - \text{Analyte Originally Present}}{\text{Analyte Added}} \times 100\%.$$

Calculation of Mean Values and Estimates of Precision

The mean value, \bar{C} , of a series of replicate measurements of concentration C_i , is calculated as:

$$\bar{C} = \frac{1}{n} \times \sum_{i=1}^n C_i,$$

where n = number of replicate measurements. \bar{C} and C_i , are both in mg/L or mg/kg.

The estimate of precision of duplicate measurements is expressed as the relative percent difference (RPD), where

$$\text{RPD} = \frac{C_2 - C_1}{\bar{C}} \times 100\%$$

The relative percent difference calculated will be compared with the respective goals identified in specific scope of work.

The estimate of precision of a series of replicate measurements (primarily used in GC/MS analysis) is expressed as the relative standard deviation (RSD), where

$$SD = \pm \sqrt{\frac{\sum_{i=1}^n (C_i - \bar{C})^2}{n-1}}$$

and

$$RSD = \frac{SD}{\bar{C}} \times 100\%$$

Completeness

Completeness will be evaluated by comparing the number of samples analyzed, as follows:

Degree of Completeness =

$$\frac{\text{Total \# of Samples for which Acceptable Analytical Data are Generated}}{\text{Total \# of Samples Acquired for Analysis}} \times 100\%$$

The goal for most programs will be at least 95%.

Section 11

CORRECTIVE ACTION

Introduction

This section identifies the data to be used in determining if a problem exists and the method of corrective action to be taken. The attached form will be used to report the out-of-control incidents.

Data

For each analytical method employed, the laboratory will track, regularly, precision and accuracy by computing the Relative Percent Difference RPD for duplicate analysis along with periodic determinations of spiked sample recovery. The mean recovery and the (RPD) of the results will be computed. The data will be compiled for each type of sample matrix analyzed. These statistics will be updated as additional samples are performed and more data are collected. When either the precision from replicate analysis, the RPD, and/or the accuracy from recovery data exceeds the control limits, the procedure will be checked for calibration, quality of the standards and analytical techniques. Analysis will be stopped and corrective action will be taken.

Actions

Corrective action will include, but not necessarily be limited to:

1. Recalibration of instruments using freshly prepared calibration standards.
2. Replacement of solvent lots or other reagents that give unacceptable blank values.
3. Additional training of laboratory personnel, if necessary, to improve the overlap between operator skills and method requirements.
4. Reassignment of personnel.
5. Re-extraction and/or re-analysis as per method requirements.

After the corrective actions have been taken and satisfactory QC sample results are obtained, sample analyses performed while the procedure was "out of control" will be re-run.

Control Limits

Whenever the analytical procedure is "out of control", the problem must be found, corrected, and the analysis repeated. Analytical results reported when the procedure is operating "out of control" will not be used unless approved. The analytical procedure is to be considered "out of control" when any of the following occurs:

- Whenever the method blank result exceeds the detection limit required for the parameter, with the exception of common laboratory solvents (e.g., methylene chloride, acetone, etc.), which must be less than five times the required detection limit for the parameter.
- Whenever one lab replicate varies by more than the limits set by specific project plan.
- Whenever reference standards or laboratory fortified samples fall outside the ranges specified in respective methods or the limits specified by a specific project plan.
- Whenever the surrogate recoveries fall outside the limits set by a specific project plan, screening of known or suspected highly contaminated samples is strongly recommended to ensure adequate addition of surrogates and internal standards where applicable. Inclusion of such results will justify any inability to comply with the prescribed limits.
- Whenever the area of an internal standard, by GC/MS analysis, is less than 50% or greater than 200% of the area in the corresponding compound in the 12 hour calibration standard. The retention time for any internal standard may not vary by more than 30 seconds from the 12 hour calibration standard.

Exception to the above requirements will be in cases where they are not realistically achievable by the USEPA method used (mainly applicable to organics analyses). Method specific control limits may be substituted when appropriate with respect to sample matrix, amount, etc. Sample results outside the prescribed limits must be reextracted and/or reanalyzed unless the laboratory is able to demonstrate that the problem is beyond the laboratory's control.

Section 12

QUALITY ASSURANCE REPORTS TO MANAGEMENT

Review

On a periodic basis, Environmetrics' QA Officer will review all QC summaries, and other aspects of the project's QA program. A brief semi-annual assessment of the adequacy of the project's QA/QC program will be summarized in memorandum to the president of the laboratory, with a copy sent to the appropriate laboratory section managers. More frequent reports may be submitted if 1) a problem needing immediate attention is identified by the QA Officer or his/her designee, or 2) it is requested by the client. The memorandum will include:

- a. Identification of any areas that appear to require remedial action.
- b. Updates of new information pertaining to remedial actions.

DATA REVIEW SUMMARY/CORRECTIVE ACTION REPORT

Data Received
 By QC Manager _____ Section: GC _____ Test Name _____
 Project Number _____ GC/MS _____ Date Analyzed _____
 Client _____ Inorganic _____ Parameter _____
 Matrix _____

Sample I.D.	Comments/Corrective Actions*

*Comments/Corrective Actions should include:

- 1) Person verifying out of control situation.
- 2) Out of control due to prep or analysis.
- 3) Corrective actions recommended.
- 4) Why out of control situation occurred.

Reviewed by:

Laboratory Capabilities

**Environmetrics, Inc.
2345 Millpark Drive
Maryland Heights, Missouri 63043
TEL (314) 427-0550
FAX (314) 427-7306
TOLL FREE (800) 333-FAST**

Table of Contents

Section I	Background, Laboratory, and Management Team
Section II	Facilities/Laboratory Instrumentation
Section III	Quality Assurance/Quality Control Summary
Section IV	Analytical Procedures
Section V	Project Summaries

Background, Laboratory,
and Management Team
Section I



ENVIRONMETRICS. INC.

Company Background

Environmetrics, Inc. was established in 1978 as an independent environmental laboratory by Dr. Eugene Scheide, formerly of the National Bureau of Standards in Washington, D.C. The company's activities have included various research and development projects for government agencies concerning sensor and gas-sensing instrument development, transformer oil testing, and environmental analysis. Today our main focus is in the area of environmental analysis.

Service

Expediency in service combined with expertise have made Environmetrics the laboratory of choice for engineering firms and industries throughout the United States and abroad. Environmetrics provides analytical services keeping the customer in mind. Our customers rely on our quality service and fast turnaround.

Environmetrics is centrally located in the midwest. The toll free number is available for the convenience of our customers.

Our customer service personnel handle requests quickly and efficiently. Our free sampling mailers can be drop shipped overnight. To meet your sampling needs, we provide prepackaged sampling mailers, including containers cleaned according to EPA standards. Preservatives, coolant, instruction sheets, labels, and chain-of-custody forms are also supplied.

Once sampling is complete, samples are sent to Environmetrics for processing. When they arrive at our facility, a systematic sample handling and analysis approach guarantees quality analytical service in a timely manner. A telephone call and written report are provided when results are obtained and approved.

The Schedule of Services

Turnaround Times

Fastrak Service: The Fastrak is an exclusive service developed to meet your demand for rapid turnaround of test results on most parameters excluding TCLP. You receive verbal results in 3 working days. That is the Fastrak guarantee. For a full TCLP scan we offer 5 working day turnaround. One or two additional days are required for submittal of the hardcopy data. Fastrak samples must be scheduled through the customer service department prior to sending the samples.

A same day or 1-2 working day service can be made available for emergency samples. Such samples are handled on a case by case basis.

Our normal turnaround is 1-2 weeks. Environmetrics is committed to its clients by providing reliability with fast turnaround.

Sample Submittal

All samples requiring the Fastrak service must arrive before 12 noon. All samples arriving after 12 noon will be logged in on the following day. Fastrak and emergency work will be reported at the end of the day it is due.

Information such as sample matrix, interferences, specific methods, QA/QC requirements, project schedule, purchase order and chain-of-custody along with specific instructions must be submitted in writing with the samples. This information will enhance data turn-around and quality.

Terms & Conditions

--Our terms are Net 30 days.

--We reserve the right to return highly contaminated samples to the client. Otherwise the cost for disposal of samples will be added to the price of analysis.

--Samples will be retained no longer than 1 month after analysis has been reported/accepted. Exceptions will be agreed upon in writing.

--Confidentiality is maintained for every client. We will sign confidentiality agreements for all projects.

The chemists, scientists, and administrative/support personnel of Environmetrics provide services in the following areas:

- TCLP Testing
- Semi-volatile Analysis
- Volatile Organic Analysis
- Pesticide/PCB Analysis
- PCB Testing in Oil, Soil, Wipes, Water and Paper
- Metals
- Phenols
- Cyanide
- Anions
- Total Organic Halogens
- Herbicides
- Polynuclear Aromatic Hydrocarbons
- Incineration Profile
- UST Parameters: BTEX
TPH
- Conventional Organic/Inorganic Parameters
- Transformer Oil Testing

Professional Affiliations/Certifications

Environmetrics participates In The U.S. EPA Performance Evaluation Program (WS and WP) for external quality assurance and quality control.
Environmetrics also participates in ASTM Round Robins.

Environmetrics U.S. EPA Identification Number is MO-066.
State Certifications for wastewater and drinking water from Iowa, Kansas, Missouri, South Carolina, and Wisconsin are pending.

**American Council of Independent Laboratories
American Society for Testing and Materials
American Chemical Society**

Laboratory & Management Team

Dr. Eugene Scheide

President

Education:

Ph.D. Analytical Chemistry, University of New Orleans

B.S. Chemistry, University of New Orleans

Areas of Specialization:

Research

Air and Water Pollution

Background and Experience:

After obtaining his Ph.D. in analytical chemistry from the University of New Orleans in 1972, Dr. Scheide worked as a research chemist at the National Bureau of Standards (NBS) in Washington, D.C. While at NBS, he was involved in methods development in air and water pollution analysis. In 1978 Dr. Scheide left NBS to start Environmetrics, where until 1986 he was Laboratory Director and President. He currently holds the position of President.

Mario Vaenberg

Executive
Vice-President

Education:

B.S. Microbiology, Southern Illinois University at Carbondale

M.S. Environmental Science, Southern Illinois University at
Edwardsville

Areas of Specialization:

Chemical Analysis

Gas Chromatography

Project Management

Customer Service/Sales/Marketing

Background and Experience:

Mr. Vaenberg joined Environmetrics in 1979 after obtaining a B.S. degree in Microbiology. While employed at Environmetrics he obtained his Masters degree in Environmental Science.

Laboratory & Management Team

Shaaban Ben-Poorat

Vice-President
Business
Development

Education:

B.S. Chemical Engineering, University of Wisconsin, at Madison
M.A. Business, Webster University at St. Louis

Areas of Specialization:

Quality Assurance/Quality Control
Marketing/Client Services
GC Section Management
CLP Project Management

Background and Experience:

After obtaining his B.S. in Chemical Engineering from the University of Wisconsin in 1969, Mr. Ben-Poorat joined Laclede Gas Company Laboratory and worked as an engineer/chief chemist until 1980. In 1980 he joined Envirodyne Engineers Inc. and worked as GC section manager, CLP project manager, quality assurance/quality control officer, and laboratory director. He was also involved in marketing and client services for the engineering/science department and laboratory. Mr. Ben-Poorat has recently joined Environmetrics as Vice-President of Business Development.

Wayne Cooper

Laboratory Director

Education:

B.S. Chemistry, Washington University

Areas of Specialization:

Quality Assurance/Quality Control
Methods and Systems Development
Data Review and Validation
LIMS
GC/MS Spectra Interpretation

Background and Experience:

Mr. Cooper obtained his B.S. in Chemistry in 1973 from Washington University and joined Environmetrics as Laboratory Director in 1986. Prior to this, Mr. Cooper was in charge of Methods and Systems Development at Norcliff Thayer, and previous to that Laboratory Director at Missouri Analytical Laboratories.

Laboratory & Management Team

Michael Austin

Operations Director

Education:

B.S. Ecology, Southern Illinois University at Edwardsville

Areas of Specialization:

Methods Development/Water Analysis

QA/QC/RCRA Development

Customer Service

Background and Experience:

Mr. Austin obtained his B.S. in Ecology (minor in Chemistry) in 1981 from Southern Illinois University at Edwardsville. He joined Environmetrics in July 1989 and became Organics Laboratory Section Manager in January 1990. Mr. Austin was director of Teklab, an Illinois EPA certified drinking water laboratory, and prior to that, laboratory supervisor/technician.

Brent Cole

Inorganics Laboratory Manager

Education:

B.S. Chemistry, Murray State University

M.S. Chemistry, University of Missouri at St. Louis

Areas of Specialization:

Technical Service

Analytical Instrumentation

Methods Development

Product Process Support

Background and Experience:

Mr. Cole obtained his B.S. in Chemistry in 1979 from Murray State University. After spending two years in graduate school at Murray State, he joined Amoco Chemicals Corporation at the Wood River, Illinois petroleum additives production facility as a technical service chemist. While employed with Amoco, Mr. Cole was responsible for analytical instrumentation, methods development and product process support. Mr. Cole received his M.S. in Chemistry from the University of Missouri at St. Louis in December 1989. He joined Environmetrics in February 1990 as Inorganics Section Manager.

Laboratory & Management Team

**Toni
Goldak**
Director of
Administration

Education:

Pursuing an Accounting degree,
University of Missouri, at St. Louis

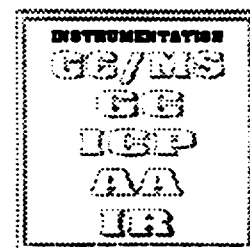
Areas of Specialization:

Accounting and Information Systems
Personnel Policies and Procedures

Background and Experience:

After spending several years with the Accounting firms of Lavenhol & Horwath, CPA, and Brandvein, Shapiro, Kossmeier & Co., Ms. Goldak joined Environmetrics in January of 1990 as Director of Administration. She is currently pursuing an Accounting degree at the University of Missouri, at St. Louis.

**Facilities/Laboratory
Instrumentation
Section II**



ENVIRONMETRICS, INC.

Section 4

In July 1989 Environmetrics moved into a new 23,000 square foot laboratory. This modern facility was built keeping in mind special design features that address the latest needs for performing trace organic and inorganic analyses of environmental samples. A 3,000 square foot warehouse with two receiving docks provides ample room for shipping, receiving and storage. Samples are brought to the shipping/receiving section and logged in a custom designed laboratory information management system (LIMS). In this section is a 150 square foot cold room to properly store samples.

The Gas Chromatography/Mass Spectrometry areas were given special design considerations. The volatiles laboratory has features which keep the area completely sealed. Independent air conditioning and heating systems allow for complete separation of air flow from the rest of the building. Continuous positive pressure minimizes sample contamination during analysis.

This facility will support Environmetrics present and long term requirements for performing environmental analysis.

Organic Analysis Instrumentation

1. Hewlett Packard 5890/5970 Gas-Chromatograph/Mass Spectrometer (GC/MS) with HP 7673A Autosampler and HP 1000 RTE-A Minicomputer Data System.
2. Hewlett Packard 5890/5970 Gas-Chromatograph/Mass Spectrometer (GC/MS) with LSCZ, ALS and HP 1000 RTE-A Minicomputer Data System.
3. Varian Saturn Gas-Chromatograph/Mass Spectrometer (GC/MS) with Tekmar LSC-2000 Purge and Trap Concentrator and ALS 2016 Autosampler with Compaq 386/20e Data System.
4. Varian Saturn Gas-Chromatograph/Mass Spectrometer (GC/MS) with Varian 8100 Autosampler and Compaq 386/20e Data System.
5. Varian 3400 Gas-Chromatograph with PID and HECD Detectors, Tekmar LSC-2000 Purge & Trap Concentrator and ALS-2016 Autosampler, and Star Data System.
6. Varian 3400 Gas-Chromatograph with PID and FID Detectors, LSC-2000 Purge & Trap Concentrator and ALS-2016 Autosampler, and Star Data System.
7. Varian 3700 Gas-Chromatograph with ECD Detector with 8000 Autosampler.
8. Varian 3400 Gas-Chromatograph with ECD Detector with 8000 Autosampler.
9. Varian 3700 Gas-Chromatograph with ECD and NPD Detectors with 8000 Autosampler.
10. Varian 3400 Gas-Chromatograph with ECD and FID Detectors with 8000 Autosampler.
11. Varian 3700 Gas-Chromatograph with FID and TCD Detectors.
12. Zymark Turbo Vap Evaporator.
13. Summit Interests SIP-1000 Portable Gas-Chromatograph with TCD and PID Detectors.
14. Fisher A-160 Electronic Analytical Balance.
15. Fisher XD-4KD Electronic Balances.

continued...

Organic Analysis Instrumentation

16. Fisher XT-3000DR
Electronic Balance.

17. IEC Centra-4B
Centrifuge.

18. Foxboro Miran 1A
Infrared Spectrometer.

19. Millipore TCLP ZHE
Extractors.

20. Heat Systems
Ultrasonic Model W-385
Sonicator.

21. Brinkmann Rotavapor
Model 461.

22. Water Quality Monitor
Portable pH, Temp
Conductivity Meter YSI
Model 3560

Inorganic Analysis Instrumentation

1. Thermo Jarrell-Ash Plasma 300 Inductively Coupled Plasma Spectrometer (ICP) with Hydride Generator and PSD-300 Data System.
2. Varian SpectrAA-400Z Zeeman Graphite Furnace Atomic Absorption Spectrometer (ZGFAAS) with Sample Dispenser and IBM PS/2-30286 Data System.
3. Varian SpectrAA-400A Flame Atomic Absorption Spectrometer (FAAS) with VGA-76 Hydride/Cold Vapor Mercury accessory, PSC-56 Autosampler, and IBM PS/2-30286 Data System.
4. Buck Scientific 400 Cold Vapor Mercury Analyzer.
5. Dohrmann DX-20A Total Organic Halogen Analyzer (TOX) with POX Sparger.
6. Bausch & Lomb Spectronics 21 Spectrophotometer.
7. Ericsen Karl Fischer Titrator.
8. Hach COD Reactor.
9. Orion 811 Ionmeter.
10. Fisher Accumet 910 pH Meter.
11. Setaflash Flashpoint Tester.
12. Mettler AE-260 DeltaRange Electronic Balance.
13. Satorius LC 2200S Electronic Balance.

Transformer Oil Analysis Instrumentation

1. Shimadzu GC-15A
TOGA Gas-Chromatograph
with TCD and FID
Detectors and Shimadzu
C-R4AD Data System.
2. Shimadzu GC-9A TOGA
Gas-Chromatograph with
TCD and FID Detectors and
Shimadzu C-R3A Data
System.
3. Horiba MESA 200 X-ray
Fluorescence Analyzer.
4. Fisher MAXX-5 Robotic
System.
5. Hipotronics OC60A
Dielectric Testers.
6. Biddle OTS60 Dielectric
Tester.
7. Beckman PF-2B Oil
Power Factor Tester.
8. Brinkmann 684KF
Coulometer.
9. Fisher 21 Surface
Tensiomat.
10. Allied 7301A Electronic
Balance.
11. Sharp PC-1500
Computer.

Computer Systems

1. Six - 80386 Computers with hard disks and VGA graphics.
2. Nine - 80286 Computers with hard disks and Hercules graphics.
3. Two - 8088 Computers with hard disks and Hercules graphics.
4. One - 8088 Computer with hard disks and EGA graphics.
5. One - 8086 Computer with hard disk and CGA graphics.
6. LANtastic Ethernet LAN's system.

**QUALITY ASSURANCE/QUALITY CONTROL
MANUAL**

**ENVIRONMETRICS, INC.
LABORATORY**

**2345 MILLPARK DRIVE
ST. LOUIS, MO 63043**

Table of Contents

	<u>Page</u>
Table of Contents	I
List of Tables	II
List of Figures	II
Approval List	III

<u>Section</u>	<u>Page</u>
1. Quality Assurance Objectives	1
2. Sampling Procedures - Containers, Preservatives and Holding Times	4
3. Sample Custody Procedures	7
4. Calibration Procedures and Frequency	10
5. Analytical Procedures	14
6. Data Reduction, Validation, & Reporting	15
7. Internal Quality Control	18
8. Performance and System Audits	21
9. Preventative Maintenance	22
10. Specific Routine Procedures used to assess Data Precision, Accuracy, & Completeness	26
11. Corrective Action	27
12. Quality Assurance Reports to Management	29

List of Tables

<u>Table No.</u>	<u>Page</u>
2.1 Preservatives and Holding Times 5 for SW-846.	
2.2 Preservatives and Holding Times 6 for Contract Lab Protocol.	
4.1 Calibration Procedures/Frequency.... 11,12,13	
9.1 Equipment Maintenance Schedule 22,23,24	

List of Figures

<u>Figure No.</u>	<u>Page</u>
3.1 Chain of Custody 9	

II

The following representatives of Environmetrics, Inc. Laboratory have read and approved this Quality Assurance Manual.

Eugene Scheide

Dr. Eugene Scheide
President

12/4/92

Date

Wayne Cooper

Mr. Wayne Cooper
QA/QC Officer and
Laboratory Director

12/4/92

Date

Craig Campbell

Mr. Craig Campbell
Organic Department Manager

12/7/92

Date

Brent Cole

Mr. Brent Cole
Inorganic Department Manager

12/7/92

Date